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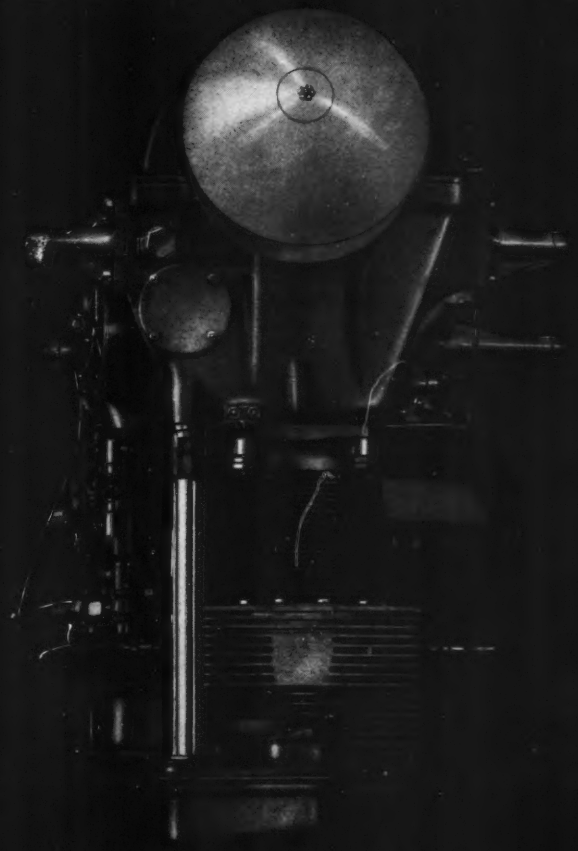

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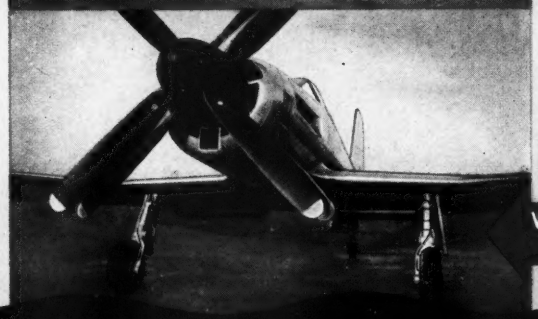

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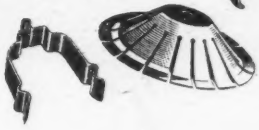

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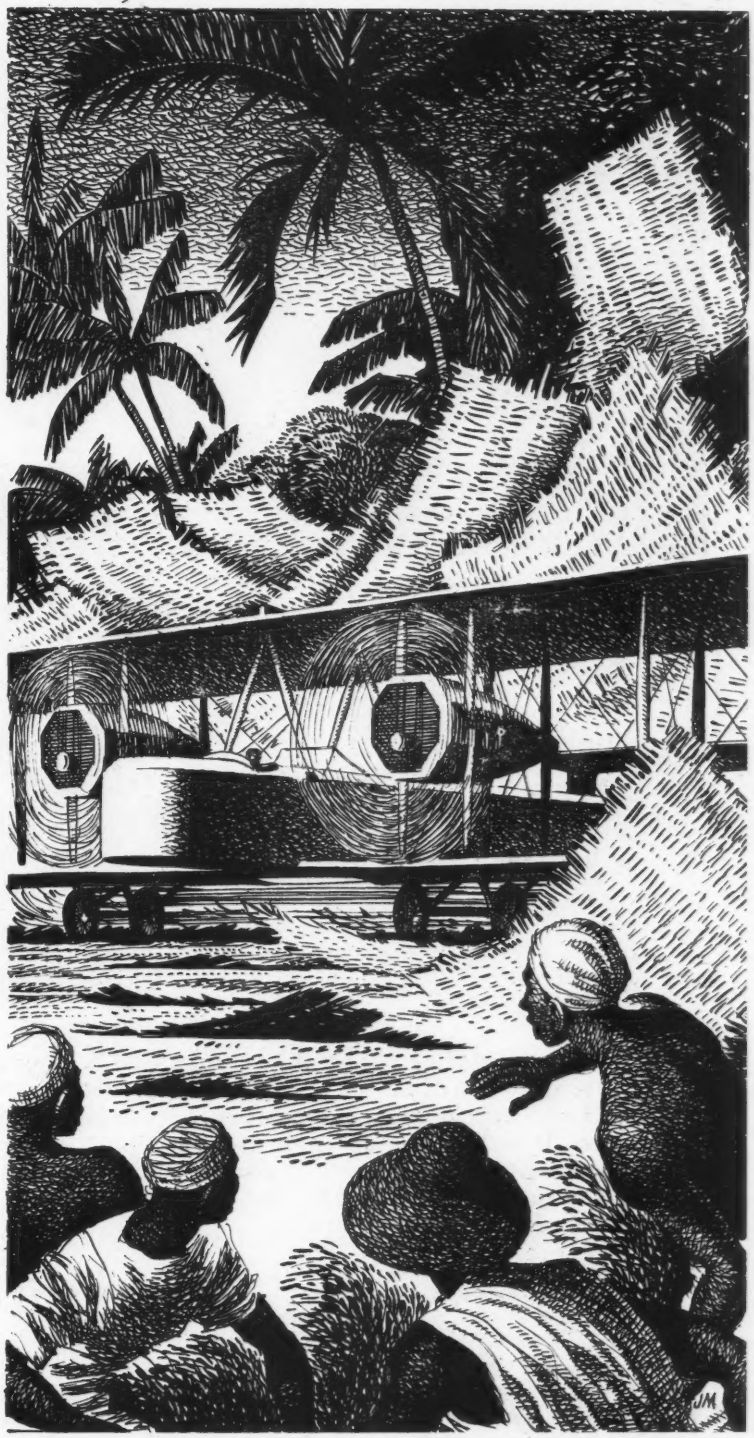

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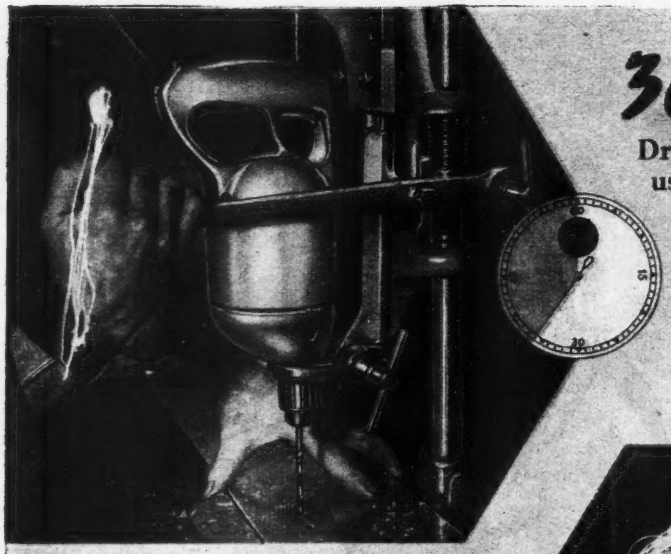

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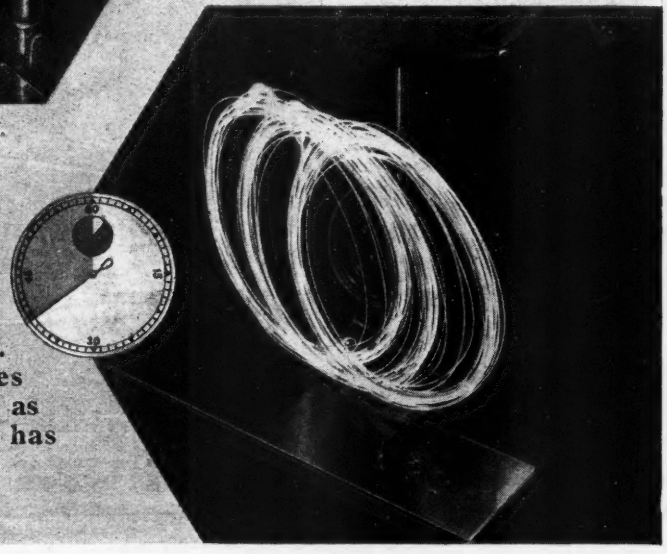

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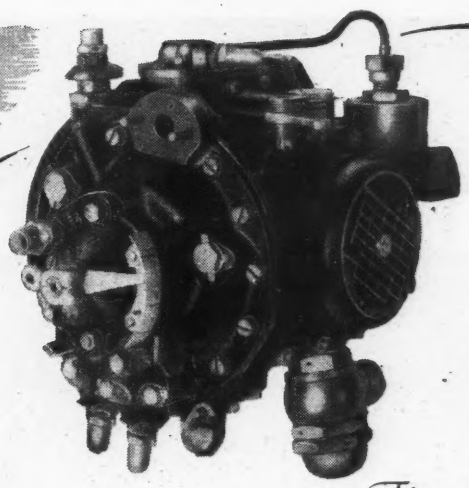

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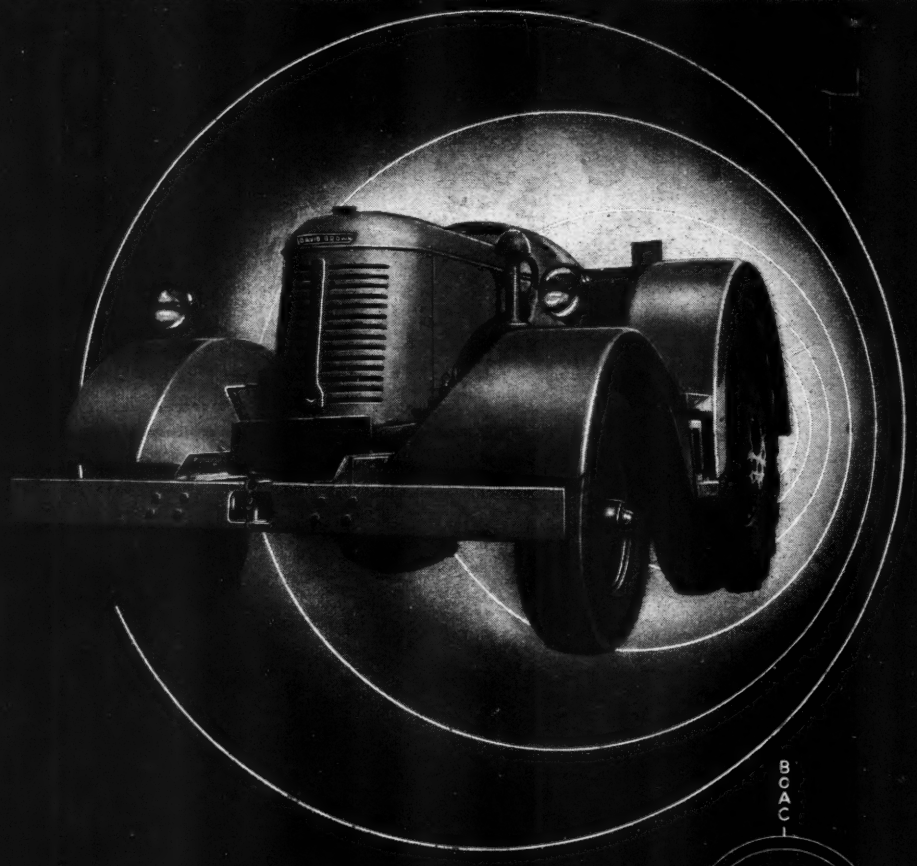

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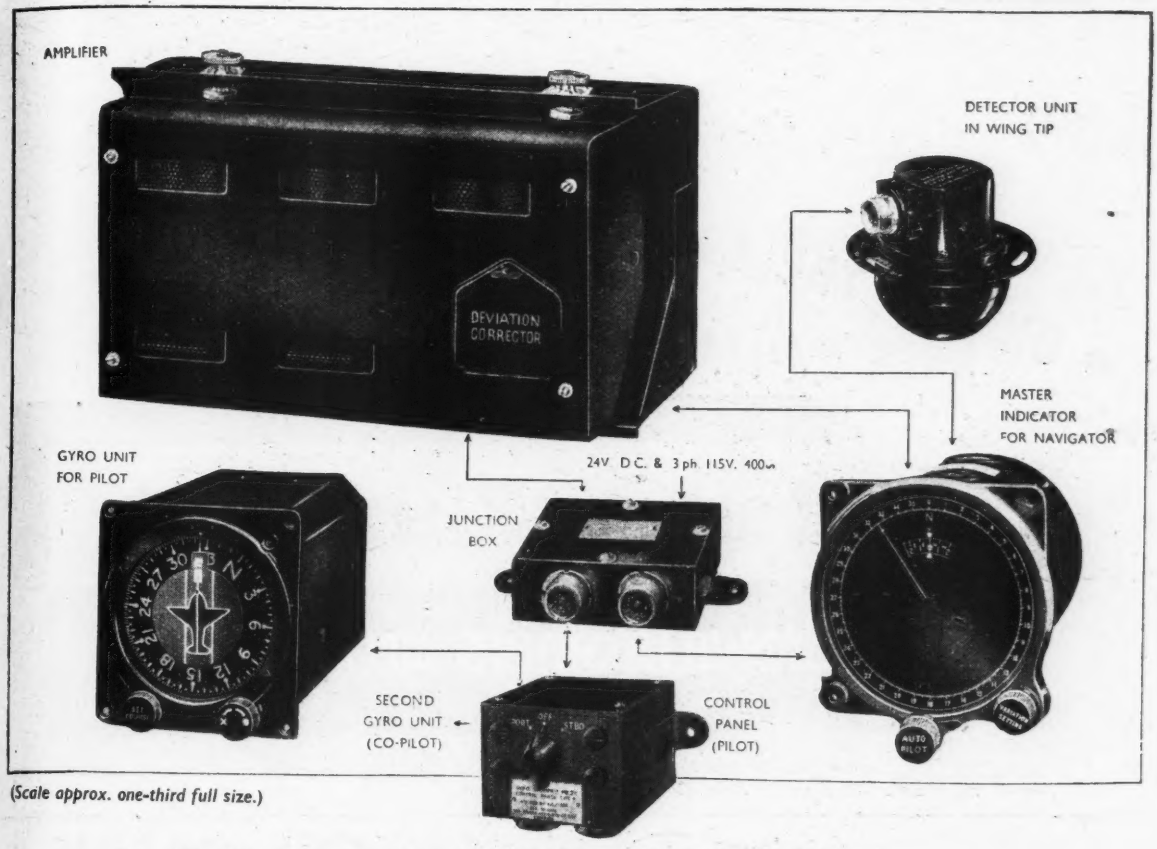

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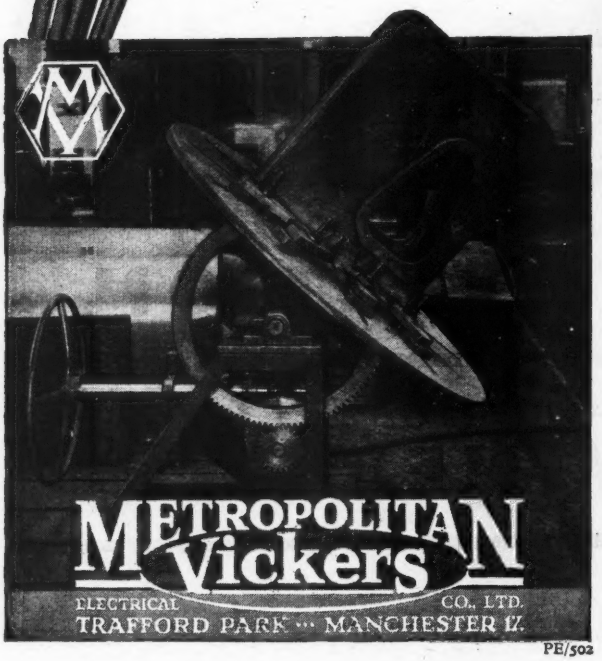

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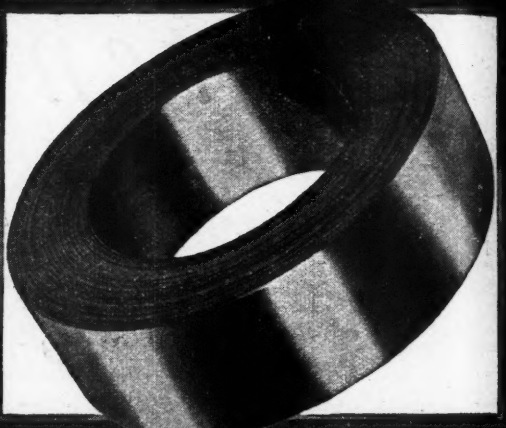

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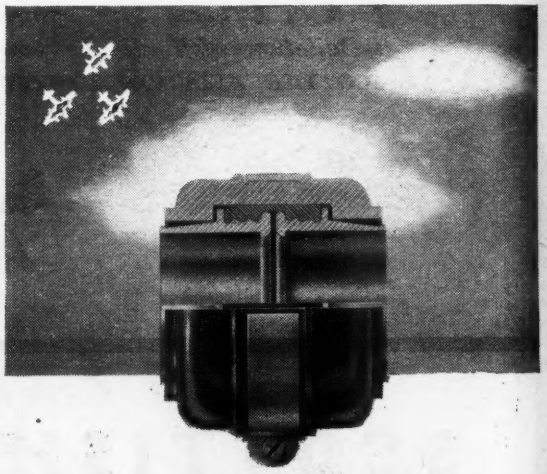

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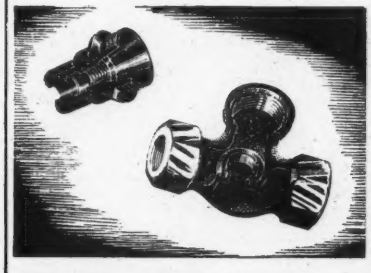

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The Outlook

Aeronautical Research

FLYING has reached the end of one stage in its evolution and is entering upon another. The well-nigh unlimited power which can be crammed into an aircraft in the form of turbo-jets and turbo-airscrews has made possible speeds which would have seemed fantastic a few years ago. We had discovered fairly clearly how the air behaves around a body moving through it at the speeds attainable with the power plants then existing, although we could hardly claim that every problem had been solved.

The higher speeds, speeds in the sonic and supersonic regions, have set us back once more into the same stage of ignorance as that which hindered the earliest attempts at mechanically-propelled flight. And it is not only the airframe which raises new problems; the power plants themselves are of such novel conception that much development work will be needed before they can reach the stage of perfection attained by the piston engine.

An inevitable result of this state of affairs has been that a need has arisen for very extensive—and expensive—research. If the British Commonwealth is to maintain a position in the forefront of these new developments, no one of its members can alone shoulder the financial burden, nor can it provide all the brain power required to examine the many directions in which knowledge should be sought.

This was realized some time ago, and in 1945 the Government of the United Kingdom suggested to the Government of Australia that the British Commonwealth of Nations should set up a council for the co-ordination and encouragement of aeronautical research within the British Commonwealth. After some preliminary negotiations, a conference was held in London, in 1946, and out of that conference has grown the Commonwealth Advisory Aeronautical Research Council, which held its first meeting at Canberra on April 2nd.

Representatives from the U.K., Australia, Canada, South Africa, and New Zealand attended the meeting, which was opened by Mr. John J. Dedman, who is Minister of Defence, Minister for Post-war Reconstruction, and Minister in Charge of Scientific and Industrial Research. He stressed the fact that the C.A.A.R.C., is parallel to the organization of the British Commonwealth itself, a voluntary association of free peoples coming together for consultation and mutual assistance.

Sharing the Task

BASICALLY the setting-up of a Commonwealth Advisory Aeronautical Research Council is obviously to be welcomed wholeheartedly. It is a logical part of the general British Commonwealth scheme, and although the difficulties that will arise in apportioning what particular research shall be undertaken by each of the nations concerned are obviously considerable, there is no reason to doubt that they will be overcome. The Canberra meeting showed that a spirit of willingness to compromise in order to avoid overlapping of expensive research animated the delegates.

Australia itself provides a fine example of this. The Australian Council for Scientific and Industrial Research, through its Division of Aeronautics, has already invested some £350,000 in research facilities, and is spending something like £150,000 annually on staff and experimental work. In proportion to the size of the population that is a worth-while contribution, and it should be borne in mind that, as Mr. Dedman pointed out, the needs of the local industry and of the R.A.A.F. are small, and the greater part of any Australian research results will be used by other nations of the British Commonwealth, some of which are a good deal better equipped than is Australia.

At the meeting in Australia, the broad outlines to be followed are being sketched out. Afterwards it will be for the respective Governments to accept any recommendations made, and to vote the necessary sums. It is as

yet too early to attempt to forecast what particular sphere each will adopt, but a glimpse was afforded by the explanations each of the representatives gave of the organization of aeronautical research in his country. Mr. L. P. Coombes outlined the Australian organization, Mr. J. H. Parkin the Canadian. Maj. Powell explained that S. Africa can best supply operational experience, and G/C. Watt recalled New Zealand's contribution in man-power.

The British delegation was headed by Sir Ben Lockspeiser, chief scientist of the Ministry of Supply, who remarked that two things which were badly needed for research were: a private waterfall for the generation of the enormous powers required to drive big wind tunnels, and a very big desert on which aircraft could come down without killing members of the civil population, and on which it was possible to see what happened to the aircraft and why it had come down. The latter appears to be not unconnected with guided pilotless machines, and as for the former, G/C. Watt reminded Sir Ben that New Zealand has a potential hydro-electric power far in excess of her own needs.

Thus the research picture begins to take shape. The United Kingdom will obviously have to shoulder the heaviest burden, but Canada already has a very useful organization which can be expanded. Australia can continue fundamental research and can contribute Sir Ben's desert and many other facilities. New Zealand has the water power, and is willing to take on any work selected for her. South Africa may provide a useful testing ground for the solution of operational problems.

Linked with the general organization is the problem of manpower. It is obvious that here there will have to be interchange of scientists and technicians on a considerable scale. That may not be the least of the problems to be solved. There is every reason to hope and expect that the foundations laid at Canberra will ultimately see a research structure arising which will make the utmost use of the potentialities which exist in the British Commonwealth.

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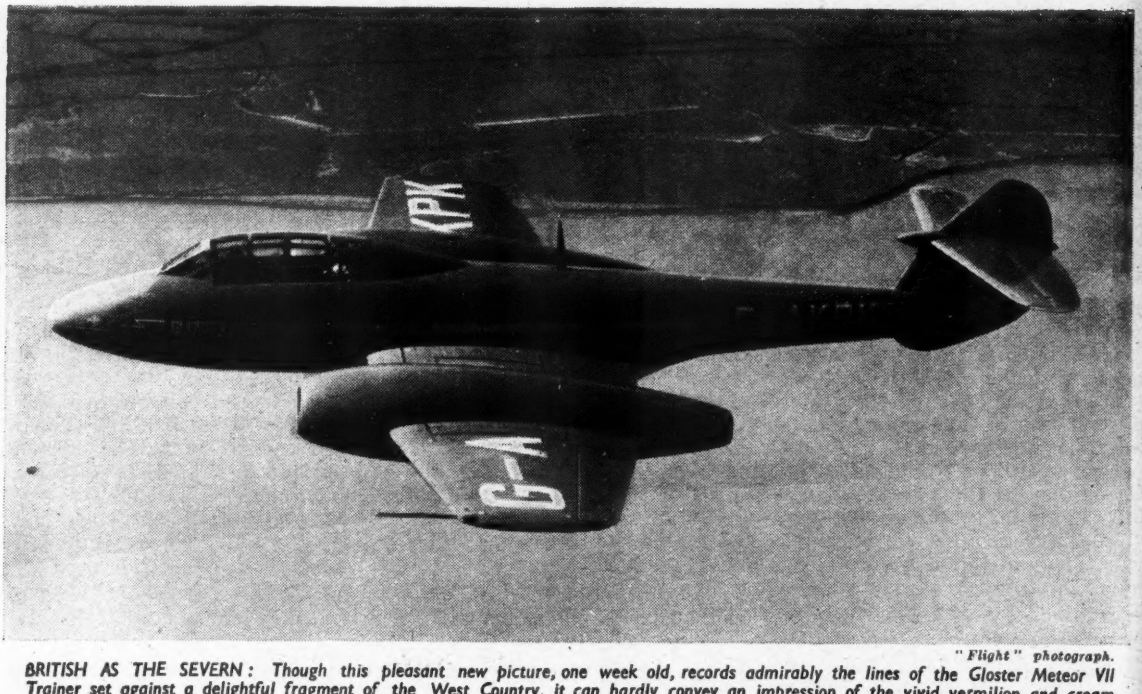
Swings and Roundabouts

THE British taxpayer will have to foot the bill to the tune of £315,000 as B.O.A.C.'s and B.E.A.C.'s share in the Irish company's deficits. This, presumably, means that B.O.A.C. will have to pay £236,250. Over and above that, the Corporation has bought the five Constellations for £315,000 each, at a profit to the Irish company of £65,000 per aircraft, or £325,000 on the five. So that altogether Eire can chuckle over the idea that poor simple John Bull is parting with the nice little sum of £1,890,000 as his contribution to her civil aviation! That should help to make up for the fact that the Irish company is now reduced to insignificance by having to part with its only modern type, the Vikings having already been sold.

From the English point of view, two advantages can be claimed for the deal: The Constellations are paid for in sterling, not in dollars, and by abandoning the flying boats B.O.A.C. will save the cost of maintaining marine bases on the Australia route. In the annual report this was stated to amount to some £1,150,000 per annum.



"Flight" photograph.

BRITISH AS THE SEVERN: Though this pleasant new picture, one week old, records admirably the lines of the Gloster Meteor VII Trainer set against a delightful fragment of the West Country, it can hardly convey an impression of the vivid vermilion and cream colour scheme of the aircraft. News of a forthcoming trip to Turkey by this remarkable jet trainer is given on the following pages.

JET TRAINER

"Flight" photograph.

From a Lancaster flown by Wing Commander Andrew McDowell, D.S.O., A.F.C., D.F.M., a senior Rolls-Royce test pilot, the Meteor Mk. VII Trainer is seen to be superficially identical with the Mk. IV fighter, except for the length of the nose and canopy.

Airborne in the Meteor VII: Unparalleled Rate of Climb: A Turkish Tour

WHEN Bill Waterton opened up the Derwent Vs of the Meteor VII Trainer and released the new twin-cell Dunlop brakes it was as though a bunch of ATO rockets had been touched off. He has promised to show us what the world's fastest jet trainer could do and we know him as a man to keep his word.

With the rear (instructor's) seat at its topmost setting, it could immediately be appreciated, as the Moreton Valence runway flashed past, that the field of view is considerably better than imagined when a preliminary ground examination of the machine was made some weeks ago. Hedgerows streamed below like so many railway sleepers before the control column eased back and the long vermilion nose pointed at the blue. The Meteor sat back on its haunches—if such a gross metaphor can be applied to so slender a form—and the altimeter wound up at nearly 8,000 feet a minute as the lush Gloucestershire countryside receded in the summery haze.

To readers who are Meteor pilots we offer an apology for attempting to convey some impression of what, to them, is daily routine. But even the R.A.F.'s Meteor fighters, which climb faster than any other Service aircraft in the world, are unable to hold the lighter Trainer on the climb, though in other respects, the performance is generally similar.

In the course of a companionable R/T chat, Waterton had given notice that he did not intend to use full thrust. Even the Rolls-Royce turbojets, he observed, lived longer with a little care. But checked as they were, the Derwents took us through three turns of an effortless upward roll and were urging us higher as we came out of the third.

Even now, we had not truly appreciated the astounding rate of climb and were startled suddenly to notice 19,000ft on the altimeter. From this level, where the fall in temperature was noticeable (we were flying in shirt sleeves), Waterton proposed to dive into compressibility. Until the needle of the machmeter approached 0.8, the dive was steady, but down at 10,000ft, with 450 knots or so on

"Flight" photograph.

The unmistakable silhouette of the Meteor VII is presented to the camera as Bill Waterton peels off. In the photographic Lancaster, L. W. McLaren, "Flight" photographer, is roped round the waist against unintentional departure through the door.

Jet Trainer . . . . .

the ASI, slight tail buffeting began to set in and there was a suggestion of hunting. At high Mach numbers—0.82 is permissible at low levels—the Meteor has a distinct tendency to pull out of the dive, which can be checked by the pilot but which at extreme speeds is accompanied by a wing—usually the port—dropping. A Mach number of 0.8 at 10,000ft gave us a true speed of 585 m.p.h.—the maximum claimed by the makers for the Meteor IV and VII. Stress analysis of the Mk. VII trainer, incidentally, shows an ultimate load factor of 9 g. at all speeds up to 600 m.p.h., in conjunction with a Mach number of 0.82.

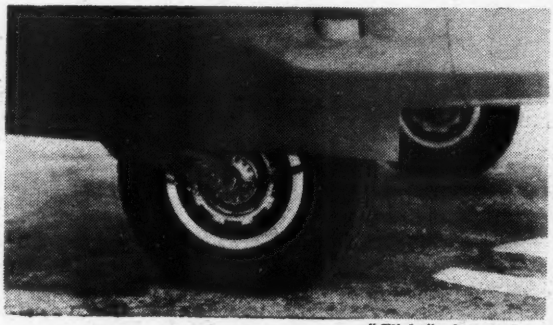
Using some of the speed accumulated in the 9,000ft drive, Waterton pulled up in a rocket loop (300 knots over the top), coming out in an aileron turn to bring us in line with Filton, where the Brabazon could be glimpsed in her hall and Freighters and Brigands were disposed in abundance.

The retarding effect of the hydraulically operated air brakes (which, forewarned by Waterton, we watched as they snapped out from the upper surface of the wing) was transmitted forcibly to our shoulder straps as the Trainer nosed steeply down. These brakes have a triple function: firstly, they enable the Meteor to descend quickly without exceeding limitations of speed and Maeh number; secondly, they can be used to steepen the dive; and lastly, they provide an invaluable means of reducing speed quickly during an attack. This third quality would prove particularly useful in night fighting and in this connection it can be said that the Meteor squadrons now flying from Horsham St. Faith have been operating by night. A Meteor on test has been put into a 70 deg. dive at 32,000ft, with the Derwents at 97 per cent of maximum r.p.m., and has descended to 4,000ft in about a minute without exceeding design limits. By closing the throttles and opening the brakes, the deceleration is about 60 per cent of that due to gravity at 400 m.p.h. Only a negligible change in trim was noted as the brakes were operated.

Heading for Moreton Valence, Waterton allowed us to take charge. Control response in a circumspect turn was ready, but as we were hurrying home at 500 m.p.h. the force required seemed heavy to one with no experience of "Meteorific" performance.

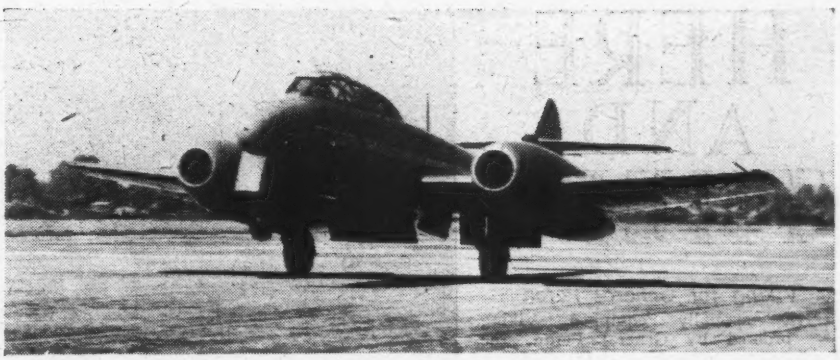
The main wheels touched, on landing, with 120 m.p.h showing on the clock.

Thus acquainted with the qualities of what is indisputably the world's fastest trainer and—excepting rocket-powered fighter and research machines—the fastest-climbing aircraft flying today, one was eager to learn of plans for a demonstration trip to Turkey, due to start on May 20th. Waterton will carry as passenger Mr. F. Cook, of Gloster's ser-



"Flight" photograph.

The Meteor Trainer is fitted with the new Dunlop twin-cell brakes. All future Meteors will be similarly equipped.



After touching down at 120 m.p.h., with more than half the fuel load remaining, the Meteor Trainer is seen before the nosewheel has made contact.

vice department, who has had to be de-pressurized in the Farnborough chamber in view of Waterton's intention to fly the first leg (Tangmere-mere-Marseilles) non-stop at 30,000ft. En route to the Turkish Air Force field at Ismer, the Trainer will pause for fuel at Rome and Athens. In addition to the 180-gallon ventral tank, two 100-gallon wing tanks will be installed. Mr. Eric Greenwood will go on ahead in the Rapide with other representatives of Gloster and Rolls-Royce. Turkey undoubtedly has a treat in store.

CONFIDENCE TRIP

Successful Mission to South America in Tudor IV

IT is both easy and natural to view the recent trip to South America by Sir Frank Spriggs and Sir Roy Dobson in a Tudor IV as a gesture of bravura, since the decision to use a Tudor for this purpose was made at a time when this type of aircraft had been hastily grounded following the loss of the B.S.A.A. *Star Tiger*. Nevertheless, the decision was a bold one and the fruits of its success are thus the sweeter.

Hawker Siddeley Aircraft have concluded signed contracts for the sale of their aircraft and aluminium houses in South America to the value of £14,000,000 and a trade mission by directors of the group had been projected for some time. What more natural than that a group aircraft, the Tudor, should be used for the purpose? British South American Airways were approached, a standard 32-seat Tudor IV, *Star Panther*, was chartered, "Hawker Siddeley Aircraft Co., Ltd.," was painted over the door, and with a B.S.A.A. crew of six, plus a Star girl stewardess, everything was arranged.

Taking off from Heathrow on Saturday, April 17th, the *Star Panther* followed the normal B.S.A.A. route to Buenos Aires via Lisbon, Dakar, Natal and Rio de Janiero.

One quite interesting point made by Sir Frank in talking of the trip, was that the various radio stations with which contact was maintained, seemed incredulous over the flight altitude and consistently asked for repeat confirmation of the altitude figures given. In this connection, the maximum altitude attained on the flight was 24,000ft and out of the total of 60½ hours' flying time, no less than twenty-eight hours were spent at about 20,000ft. The whole flight was made "above weather" whilst, it appeared, pretty well all other aircraft flying the scheduled routes were averaging 12,000ft and flying "in the dirt." Pressurization has very real value.

Sir Frank reported that the Tudor went like a sewing machine throughout; there was never a hint of trouble in any shape whatever and the comfort and noise level were, in his opinion, better than that to be found in the finest trains. Night landings were made at various times and some of the airfields visited were of by no means high standard, so that the ground manœuvrability of the Tudor was well tried. The commander of the aircraft, Captain D. M. Walbourn, had not the slightest difficulty with *Star Panther* and it was demonstrated that at any airfield where an American machine of comparable size could go, there could the Tudor IV go also.

The Argentine Air Force have had Meteors for some little time, of course, and are more than pleased with them. Many of the pilots were trained on Meteors by Hawker Siddeleys in this country and they fly their aircraft extremely well. In addition to Meteors, Argentina also have some Avro Lincolns and, as a result of this trade mission, it is possible that orders will be placed for Avro Athena trainers and for the two-seat Meteor trainers. The South Americans are very jet-minded and this accords well for the future export of our industry's products. Argentine officials were given a trip in the Tudor and were said to be very impressed with its qualities. The order they had placed for Tudors was cancelled following the grounding of the type, but whether the cancellation is rescinded is chiefly a financial matter, particularly since alternative orders for American aircraft have been placed. In the light of this, the repercussions of a panic decision are clearly evident.

Star Panther's passenger list was as follows: Sir Frank Spriggs, K.B.E., Lady Spriggs, and their daughter Miss June Spriggs; Sir Roy Dobson, C.B.E., and his daughter, Mrs. Broadhead; Brigadier-General Crossland, Miss Diana Crossland, Major A. G. P. Collins and Mr. R. Conner.

The aircraft returned to Heathrow on Sunday, May 9th.

TOWARDS CHEAPER PRIVATE FLYING

SOME further details of the Royal Aero Club's new maintenance schedules for privately owned aircraft, referred to in *Flight*, May 6th, are now available. The broad outline of the scheme includes a monthly check; a six-monthly inspection with an over-riding maximum of 120 hours; a twelve-monthly inspection coinciding with the renewal of the C. of A., and a three-yearly complete overhaul now associated with the C. of A., with an over-riding maximum of 500 hours. The engines and accessories must be maintained in terms of hours as laid down in the makers' handbooks; since there are often certain features of the airframe associated with the engine, and peculiar to certain aircraft, it is the intention of the R.Ae.C. to prepare engine schedules transcribed from makers' handbooks.

The first of these schedules applies to privately owned single-engined aircraft of total maximum authorized weight of 3,500 lb, and is called "General Maintenance Schedule, R.Ae.C/1, Issue 1"; it is effective from June 1st, 1948, and covers airframes only. Any modifications, rectifications or special inspections considered essential by the A.R.B. must be completed within the time specified and a record of the work entered and certified in the log-book. Details of rectifications performed during the monthly inspections should also be enumerated, as well as those *not* carried out or otherwise outstanding, in the log-books. Engines and V.P. airscrews are to be maintained in accordance with makers' recommendations as approved by the A.R.B., and instruments and accessories must be overhauled in accordance with A.R.B. regulations.

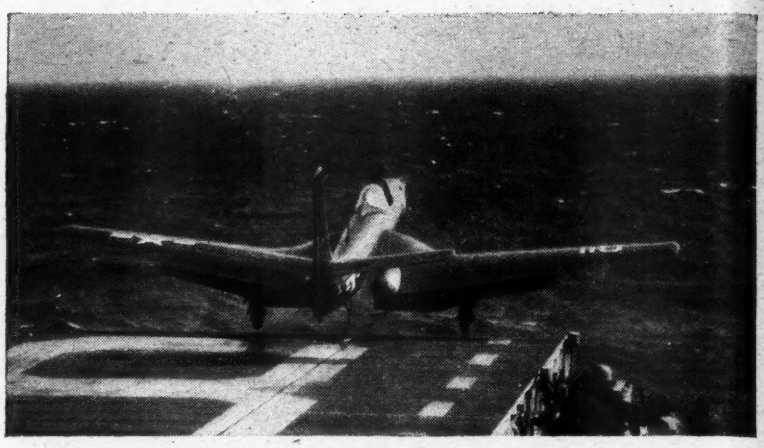
The select committee appointed by the R.Ae.C. is continuing its work in conjunction with the A.R.B., and schedules relating to private aircraft in the higher weight categories will be issued.

ASTRAL PERFORMANCE

ON Tuesday evening last, the Adastral Players made an excellent job of Frank Harvey's *Saloon Bar* at the Scala Theatre. It was their 29th major production. This particular play has the great attraction for amateur dramatic groups of requiring a large cast—there are twenty-five characters, five of whom are principals—but involves the difficulty of combining drama with comedy and the latter, more than any other stage quality, calls for a delicately skilled touch.

Percival Griffiths and Dorothy Henzell both did more than well, but the triumph of the evening belonged to Frank Barnard whose performance in the leading rôle was the more outstanding in view of it being his stage début. *Saloon Bar* is not an easy play for amateurs: there is little physical action and thus the development is somewhat wordy, but Miss Alison Munro produced her characters expertly and, after the first quarter of an hour, the pace was carried at a steadily increasing tempo. Altogether it was an evening much appreciated by those on each side of the footlights.

HERE AND THERE



SPECTRAL DEPARTURE: A McDonnell Phantom fighter, one of a squadron aboard the U.S. aircraft carrier "Saipan," leaves the deck under the impulse of its twin Westinghouse turbojets and a catapult, the bridle of which can be seen. The Phantom has a relatively low performance, but will be succeeded by such types as the Grumman Panther, capable of well over 600 m.p.h.

Viking for General Peron

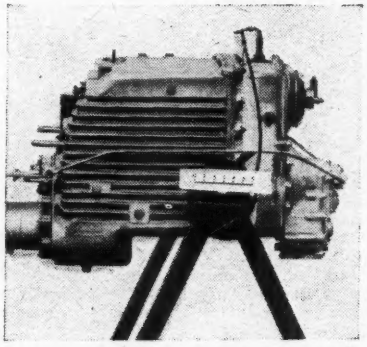
THE specially equipped Viking ordered by General Peron, the President of Argentina, left Prestwick on May 12th on its delivery flight to South America. Piloted by W/C. Boyd, the Viking flew via Greenland and reached Gander the next day.

Gordon Bennett Race

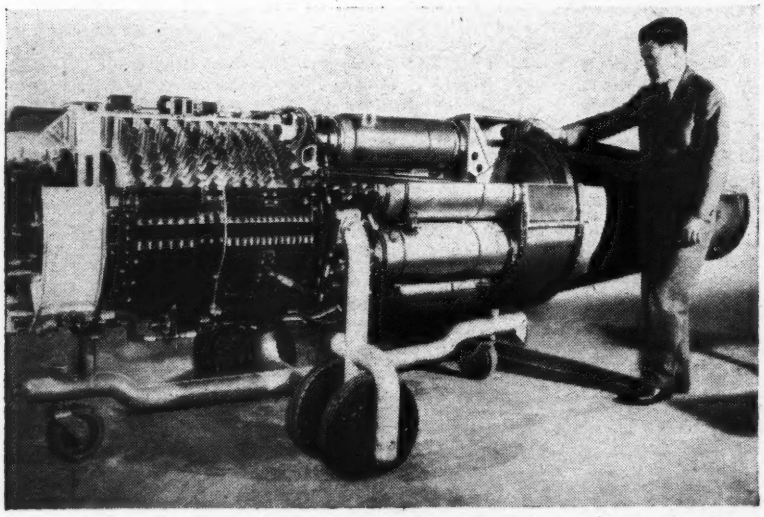
THE Gordon Bennett balloon race, which was first held in 1906, is to be revived next year. The race, which is a long-distance event, will start in Brussels and will be organized by the Belgian Air Association. The last race of this series was held in 1938 and was won by the Polish balloon "L.O.P.P." after a flight of approximately 1,000 miles.

Turbines for Cars

THE picture which appears on this page is from *The Autocar* and shows the first automobile gas turbine to run under its own power. Produced by the Rover Co., the turbine is described by Mr. Geoffrey Smith, Editorial Director of *Flight* and author of "Gas Turbines and Jet Propulsion," in our associated journal, *The Autocar* for May 7th and 14th. The turbine wheel is of 5in diameter, and at 55,000 r.p.m. 100 h.p. is produced. There is a saving of at least 200 lb in weight as compared with a normal six-cylinder car engine of equivalent power.



TWO POUNDS PER HORSEPOWER: The Rover gas turbine for cars referred to in an accompanying paragraph.



FROM THE OUTSIDE LOOKING IN: For the first time the interior details of the Allison TG-180 (Air Force J-35) turbojet were open to public examination when this sectioned unit was exhibited before the American Aviation Writers Association in New York. This axial-flow design has eleven stages of compression, eight combustion chambers and a single large-diameter turbine The overall diameter is 37.5in and it is rated at 3,750 lb thrust.

English Electric Move

AT Whitsuntide the aircraft division of The English Electric Co., Ltd., moved to Warton airfield. The Corporation Street, Preston, offices closed on May 14th and opened on May 20th at the new address, which is: The English Electric Co., Ltd., Aircraft Division, Warton Aerodrome, Near Preston, Lancs.; telephone, Freckleton 371. Facilities are available for visitors arriving by air.

Game-keeping by Air

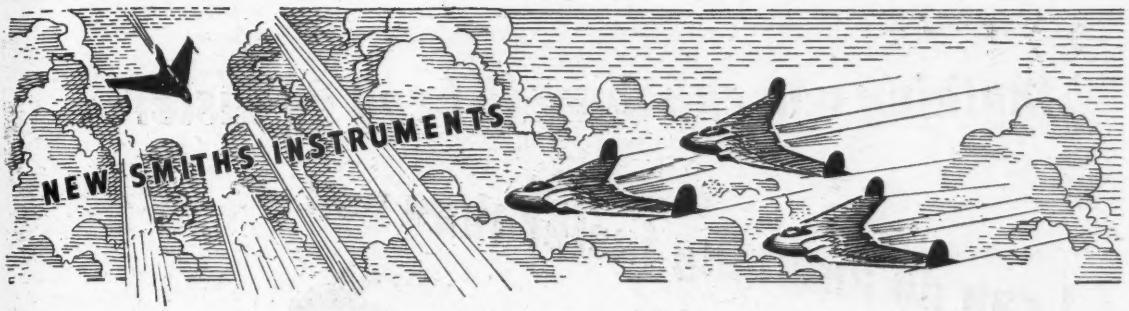
IN Ontario wild-life curators have recently used aircraft in an attempt to put a stop to fur poaching in Algonquin National Park, where trapping is forbidden. On a recent flight to investigate suspected poaching an aircraft was seen taking off and was chased by curators who caught it when the aircraft landed to refuel. Investigation revealed 54 beaver pelts valued at £400.

Derby Air Display

A FLYING display is to be held on June 5th at Burnaston airport by No. 16 Reserve Flying School in conjunction with the Derby Aero Club. The display is to encourage R.A.F. recruiting and over 8,000 people are expected to attend. The programme will include a march-past, and inspection by the A.O.C. and the annual air race for the Harben Memorial Trophy, which last year aroused considerable interest. Demonstrations of glider and formation flying will be given. S/L. Porteous will give a display of aerobatics in a Sparrowhawk. A Nene Lancastrian and a Meteor or Vampire will also take part.

Prelude to Glory Reprinted

THE story of the creation of Britain's parachute army told by G/C. Maurice Newnham, O.B.E., D.F.C., who commanded the Parachute Training School, in his book *Prelude to Glory*, extracts from which were published in *Flight* during August, 1947, is to be reprinted. The first edition, published by Sampson Low, Marston and Co., Ltd., was sold out almost immediately and in response to very numerous requests from



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HERE AND THERE

men who actually served with the Airborne Forces, their relatives and others, reprinting is in progress. The new edition is expected to be ready for sale on June 6th, the anniversary of the Normandy invasion by the 6th Airborne Division.

Stratocruiser Tests

THE first two Boeing Stratocruisers have completed over 286 hours' flying, of which about 40 hours have been occupied in Civil Aeronautics Authority certification tests covering flying characteristics, landing, take-off and performance. The third Stratocruiser recently completed its first flight, remaining in the air for one hour forty-nine minutes; this aircraft will be used for radio, fuel system, anti-icing tests.

U.S. Air Exhibition

IN a report on the progress of the arrangements for the International Air Exhibition to be held in New York from July 31st to August 8th, Mr. Grover Whalen, who organized the New York World Fair in 1939 and is in charge of the forthcoming exhibition, said recently that more new aircraft than have ever been brought together before are expected to be assembled for the great public demonstration of air power and air transport progress. Air-sea rescue operations by U.S. Coast Guard helicopters will be demonstrated.

N.P.L. "Open Day"

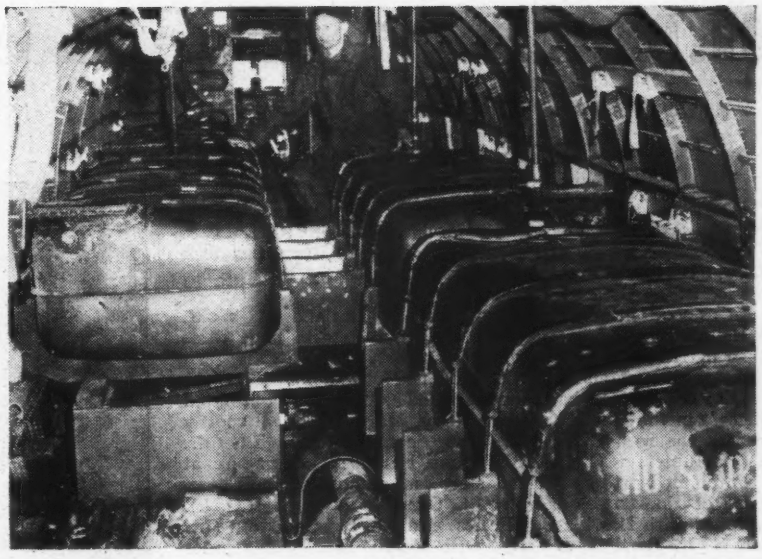
THE NATIONAL PHYSICAL LABORATORY at Teddington is holding from 2.30-6 p.m. on Monday, June 21st, an "Open Day" to which representatives of industrial organizations are being invited.

The wide range of scientific research and investigational work undertaken at this establishment is already well known to industry, but there may still be a large number of firms with whom the N.P.L. has no contact. Some of these will undoubtedly wish to take this opportunity of seeing the scope of the Laboratory's activities, and a number of invitations is being reserved for this purpose.

Accredited representatives of industrial organizations interested in the work of the Laboratory are invited to apply to the Director, National Physical Laboratory, Teddington, Middlesex, not later than Saturday, June 5th.

New Durban Firm

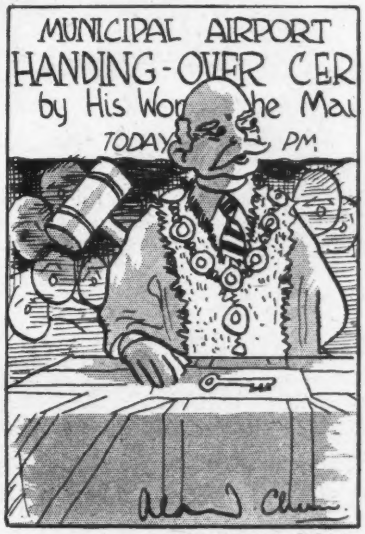
A. F. CAMBRIDGE & CO. (PTY.), LTD., has been formed in Durban to offer service to airline operators who require general and booking agency representation and to manufacturers requiring sales representation and secretarial duties in the Union. The four directors are: Mr. A. F. Cambridge, until 1946 managing director of Indian National Airways, who is on the executive committee of I.A.T.A.; Mr. W. Bradshaw, previously general manager of I.N.A. and a former member of I.A.T.A.'s Traffic Committee; Mr. J. A. Fleming, who was for many years general manager and deputy general manager of I.N.A.; and Mr. I. Whitman, also of I.N.A., and who served for several years in the R.A.F. The address of the new company is Poynton's Chambers, 339, Smith Street, Durban.



D.D.T. DAKOTA: In a campaign to save Austrian spruce forests from the ravages of the nun moth, D.D.T. insecticide is being sprayed on the trees from the air. Large areas of valuable trees on the borders of the American and British zones of Austria are to be dealt with and considerable flying skill is needed for this operation.

Air Photo Specialists

ASTRAL AVIATION, aerial photographers and air surveyors, is now established at Cowes Airport, Isle of Wight, having vacated its temporary accommodation at White Waltham. Founded in 1926 by Mr. James Furner, this firm operated an extensive aerial photographic and survey business from Croydon airport until 1939, when it was closed down. In 1946 Mr. Furner returned after seven years' service overseas, and started afresh to build up the business again with the assistance of Mr. Trevor Gooch, an ex-fighter pilot. Astral Aviation claim that from their extensive list of clients at home and abroad they have never had a complaint regarding their work, which is mainly concerned with surveying and export publicity.



". . . and now, if the Ministry of Civil Aviation representative will kindly step forward—"

News in Brief

After being suspended during the winter when the land is covered with snow, the work of mapping Canada from the air has been resumed. Twelve Dakotas and four long-range Lancasters are engaged in this task and it is hoped to cover 550,000 square miles this year.

* * *

A B.O.A.C. Lancastrian recently left Karachi with eight crocodiles, bear cubs, hyenas, jackals and squirrels on board. A baby elephant is due to be flown shortly from Karachi in company with 300 monkeys which will be destined for a German medical research firm.

* * *

Prospective applicants for the Busk Studentship in Aeronautics, reference to which was made in *Flight*, April 15th, are reminded that the application forms, which are obtainable from the Professor of Aeronautical Engineering, the Engineering Laboratory, Cambridge, must be completed and returned before June 1st.

* * *

The Parks Committee of Croydon Council has forbidden the flying of mechanically driven model aeroplanes in the town's parks. The chairman of the committee has stated that the ban was imposed because of the noise of these models and because they were considered to be dangerous to other users of the parks generally. No restrictions have, however, been placed on rubber-driven model aircraft.

* * *

Mr. John Pomeroy, of Melbourne, has filed a claim on the United States Government for £A5,000,000 (approximately £4,000,000 sterling) for the invention of a shell which, he was told by the Australian Army Inventions Board in 1942, had saved London. Mr. Pomeroy was awarded £20,000 by the British Government for the Pomeroy missile which brought down the first Zeppelin at Cuffley, Hertfordshire, in 1916.

H.M.C.S. "Magnificent"

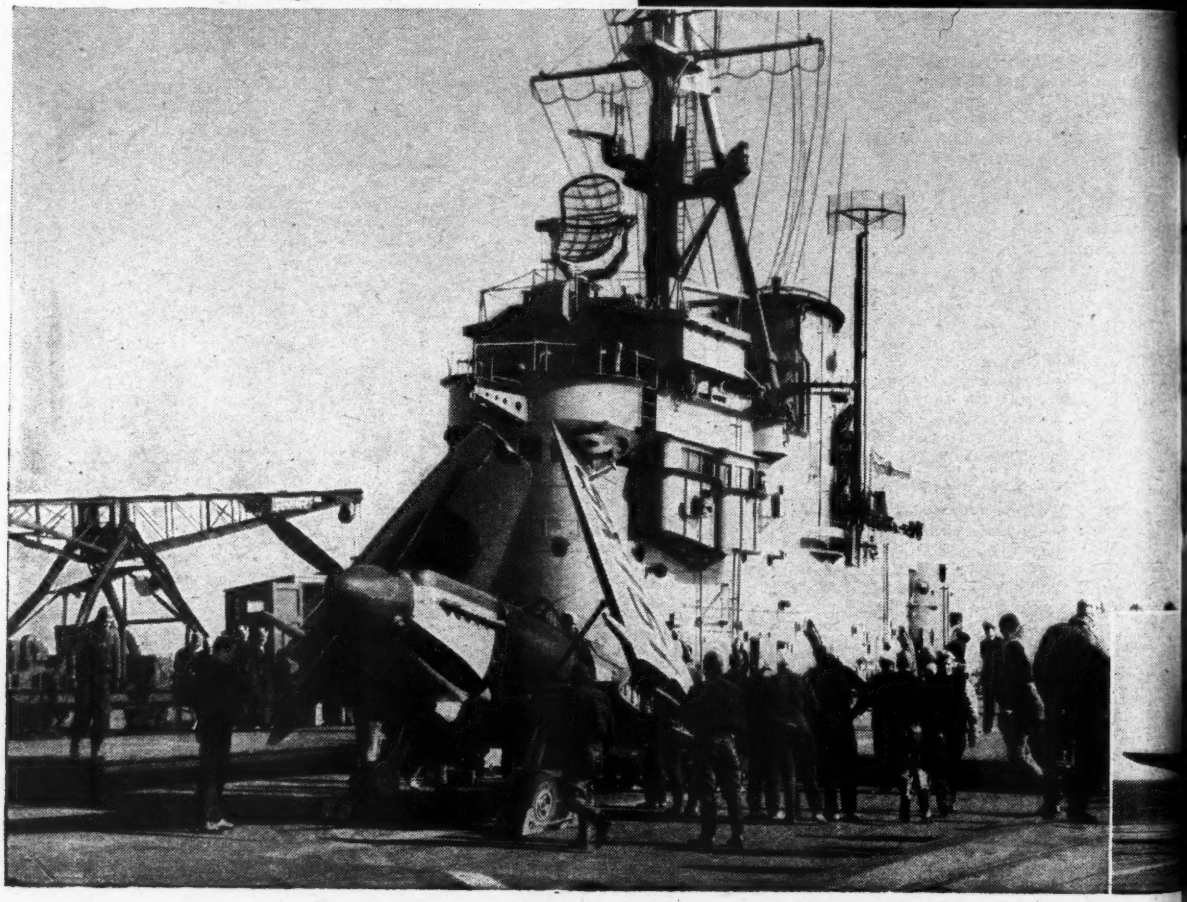
Four Types of Aircraft Take Part in Deck-landing Trials of Canadian Carrier

SOME unusually vivid photographs on these pages, and on page 551, depict recent deck-landing trials aboard H.M.C.S. *Magnificent*, the first carrier owned by the Royal Canadian Navy. H.M.S. *Warrior*, previously operated by the R.C.N., was loaned by Great Britain.

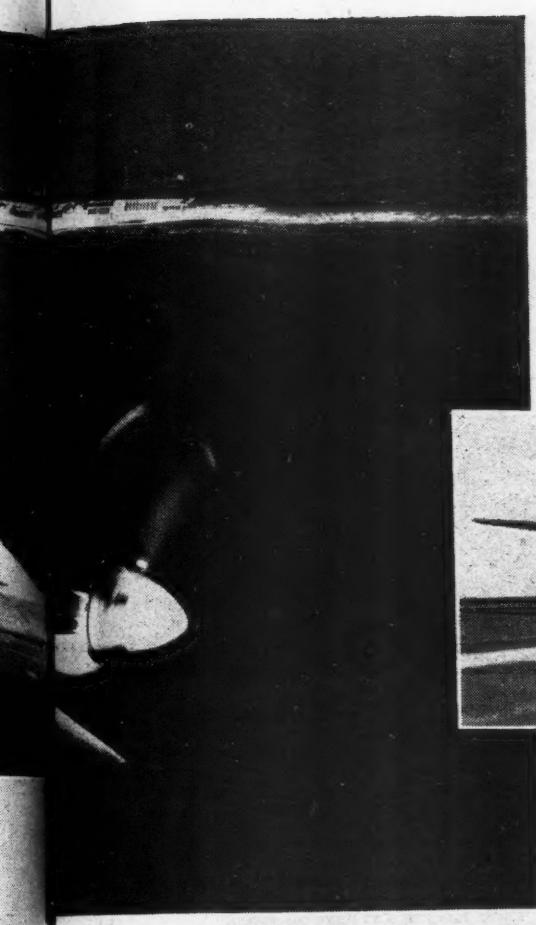
An 18,000-ton light fleet carrier built by Harland and Wolff, of Belfast, *Magnificent* is the first of her class to have three crash barriers. Her flight deck measures 670ft x 80ft.

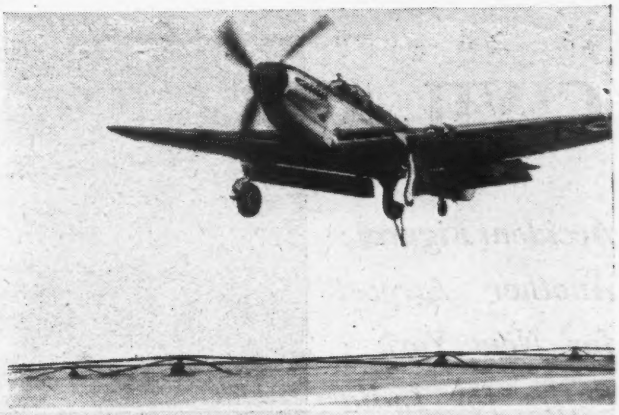
Under the command of Commodore H. G. de Woolf, C.B., D.S.O., D.S.C., who has been described as "the most decorated officer" in the Royal Canadian Navy, *Magnificent* will shortly embark the 19th Carrier Air Group, commanded by Lt. Cdr. H. J. Hunter, R.C.N. This Group has been working-up at Eglinton in Northern Ireland since last summer, and is composed of No. 803 Squadron (Lt. Cdr. H. J. Bird, R.C.N.), equipped with Hawker Sea Furies, and No. 825 Squadron (Lt. Cdr. R. E. Bartlett, R.C.N.), with Firefly IVs. Commander Reed, R.C.N., is Commander Flying.

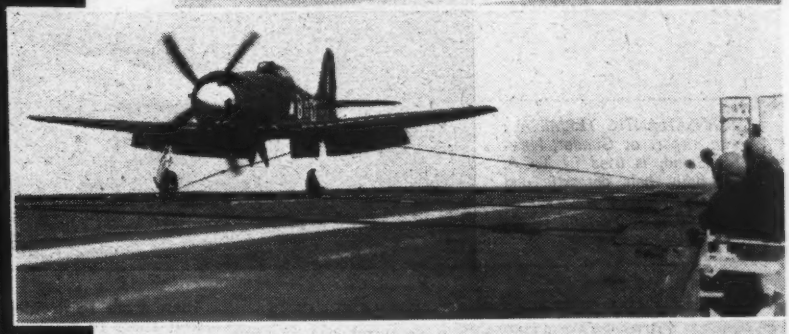
For preliminary deck-landing trials use was made of two Sea Furies, two Firefly IVs, two Seafire XVIIs, and two Avengers. Thus the arrester gear and other equipment has been proved by light, medium and heavy naval aircraft.

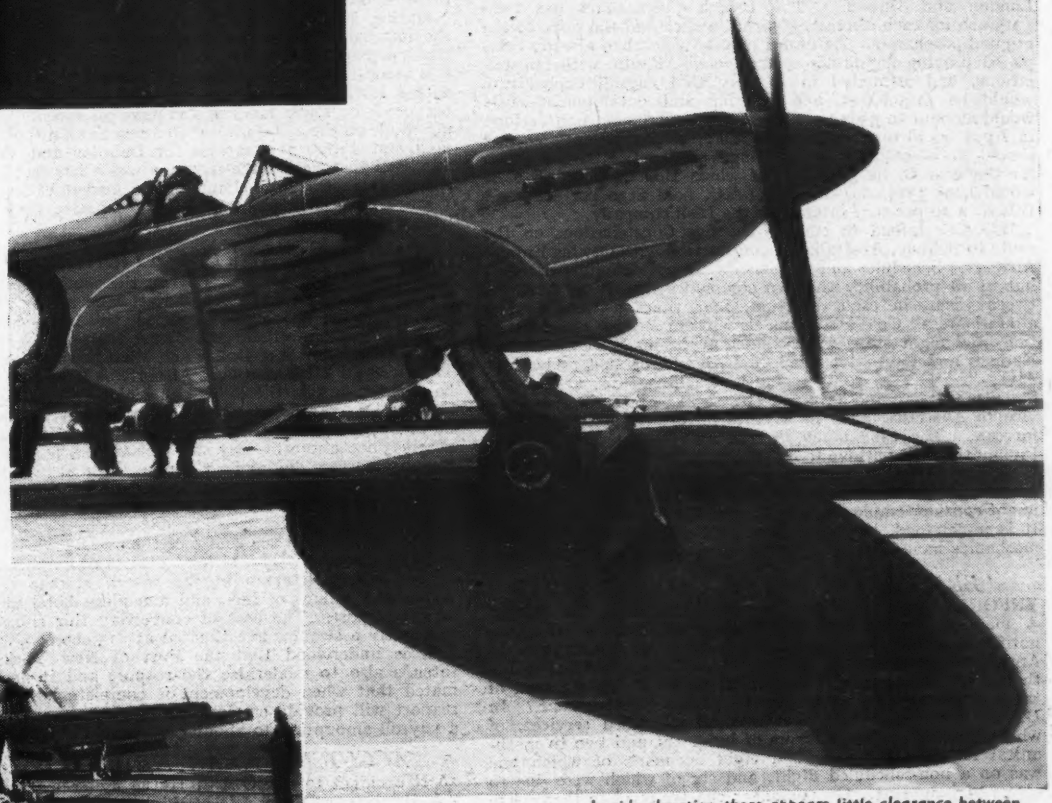


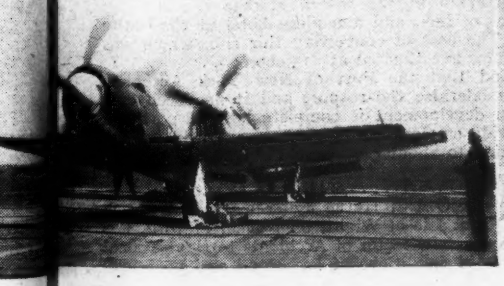
(Centre) The graceful sweep of the Hawker Fury as it circles the "Magnificent" makes a truly aero-nautical picture. (Below) A folded Seafire ranged on the lift.











o right) *A Firefly comes in over the round-down.*

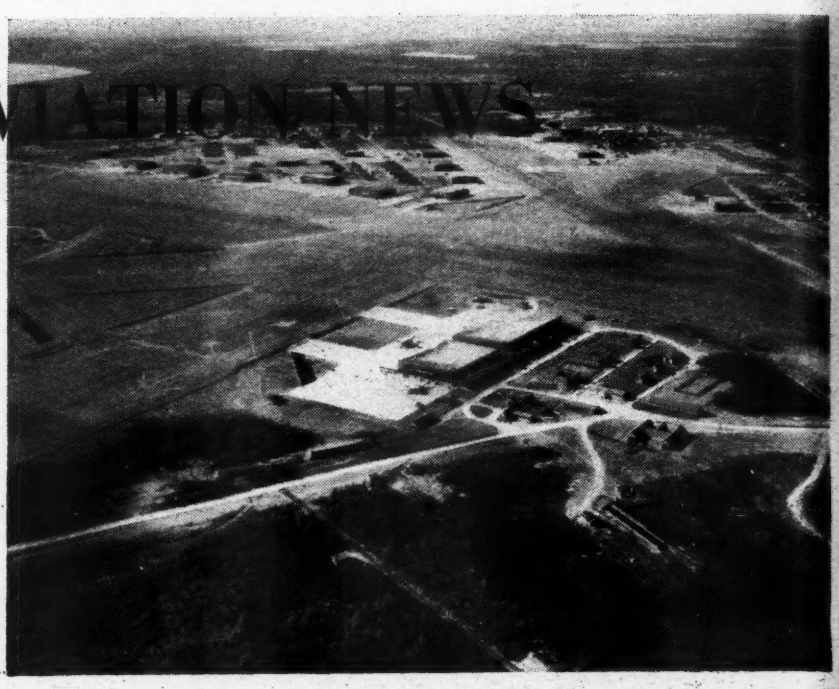
ntre right) *The ester wire is pulled gh by a Sea Fury.*

low) *Awaiting the f." A Sea Fury and refly ranged ready for take-off.*

In side elevation there appears little clearance between the Seafire's airscrew and the accelerator bridle.

CIVIL AVIATION NEWS

Accident Figures: Another Airport for New York: Safirs for India



TRANSATLANTIC TERMINAL: The airport at Gander, Newfoundland, is used by T.C.A. for both their domestic and overseas routes; it serves as a refuelling stop for all transatlantic operators.

IRISH CONSTELLATIONS PURCHASED

BRITISH OVERSEAS AIRWAYS have purchased the five Constellation aircraft from Irish Airlines which were to be used on the Irish company's transatlantic service, and two of which were already employed on high-frequency flights between London and Dublin. The British Corporation has paid £315,000 for each aircraft, £65,000 in excess of the price to the original purchasers. Aerlinte Eireann, which had already completed proving flights across the North Atlantic with Constellations, had estimated in January that capital expenditure would be £1,598,000, and training and development costs would amount to £504,000. The Irish Government had decided in April, as already announced, that the transatlantic service should be abandoned. Aer Lingus had estimated its losses for the year to be £647,000, of which B.O.A.C. and B.E.A. would bear £315,000, since B.O.A.C. hold a 30 per cent and B.E.A. a 10 per cent interest in the Irish company.

B.O.A.C. intend to employ the five Constellations on the route to Sydney, Australia, in conjunction with Qantas Empire Airways. Schedules and frequencies are not definitely decided, but in all probability the two companies will fly services between them, in each direction, four times a week. The aircraft are all Gold Plate models without sleeper accommodation, and night stops will presumably be made at Singapore, Karachi and Cairo, the whole journey taking just under four days. The Q.E.A. route includes refuelling stops at Darwin, Calcutta, Basrah and Tripoli. There will be no flying-boat service to Australia, and the Hythes have already been offered for sale. The time taken by the flying-boats was 7½ days. Plymouths will continue to fly on the B.O.A.C. routes to Hongkong and Japan. Contrary to other reports, there has been no condition of sale, but it is understood that B.O.A.C. might consider employing the Constellation-trained Irish crews. It is understood, however, that some of the Irish pilots and mechanics have already accepted offers extended by Pakistan.

BRITISH OPERATING ACCIDENTS

INFORMATION provided by Mr. Lindgren, the Parliamentary Secretary to the Ministry of Civil Aviation, on notifiable accidents to landplanes from January 1st, 1946, to April 30th, 1948, showed that in B.O.A.C. on scheduled flights there were ten accidents, on non-scheduled flights six, and of those accidents 13 were due to errors of judgment. In B.E.A there were nine accidents on scheduled services, of which three were due to errors of judgment and two to mechanical failure. B.S.A.A. had eight accidents of which one was on a non-scheduled flight, and six of which were due to errors of judgment. On passenger charter services there were 21 accidents, of which 15 were due to errors of judgment and three to mechanical failure; and on non-passenger services there were 19 accidents, 14 of which were due to pilot error and three to mechanical failure.

Of fatal accidents, B.O.A.C. had two, B.E.A. had three—of which one was the result of a collision over Berlin with a Russian fighter aircraft—and B.S.A.A. had four, in which three involved the deaths of all on board.

During a debate on the subject, attention was drawn to the increasing responsibility thrust upon the captains of aircraft through the introduction of various aids. An appeal was made for the manufacturers' attention to the use of fuel with a lower fire point to reduce the fire hazard, and also to the need for lower landing and take-off speeds. In reply to questions on the suitability of Renfrew as an airport, Mr. Lindgren stated that it was safe for Dakotas and Vikings. He admitted that one of the runways was a few feet short of the standard length required for a fully loaded Viking, but since Vikings using Renfrew were of low capacity they could land with a shorter run.

NEW YORK INTERNATIONAL AIRPORT

AT the head of Jamaica Bay on the south-eastern outskirts of Brooklyn 4,900 acres of wasteland are to be converted into an airport which, it is claimed, will be nine times larger than La Guardia airfield and bigger than the Chicago, Washington, San Francisco, Dallas and Miami airports put together. The New York International Airport, as it will be called, will have six runways, the longest of which will be 9,500ft, built roughly in a parallelogram formation so that two runways can be in operation at all times. In this way it is expected that nearly 3,000 aircraft a day can be handled, as compared with the 425 to 450 a day at La Guardia. The airport will be kept free from high-tension wires, trees, and other obstructions in the interests of safety, and a motor tunnel, which will cost approximately £625,000, will permit cars to pass to the administrative buildings in the centre of the airfield without obstructing the runways. The estimates for this airport call for 15 of the largest hangars in the world, storage capacity for 10,000,000 gallons of fuel, and a modern hotel at the centre of the airport. The cost of converting this site, which was previously a swamp, is estimated at £15,000,000.

It is understood that the Port of New York Authority intends also to modernize the seaport and it has been estimated that when development is complete both airport and seaport will provide employment for 29,000 and will involve a payroll amounting to about £17,500,000 a year.

ACCIDENT NEAR NEWPORT, I.o.W.

AN accident to a B.O.A.C. Hythe flying-boat which struck Brighstone Down, Isle of Wight, on November 19th, was attributed by the Chief Inspector of Accidents to Navigational errors by the pilot in conditions of low cloud and poor visi-

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Civil Aviation News . . . . .

bility. The aircraft was on a flight from Hythe to Poole where later it was due to proceed on scheduled flight to the Far East. After taking off from Hythe the pilot intended to cross the coast in a South-Westerly direction in the neighbourhood of Lymington and follow the coast across to Poole. The cloud base was at 450 feet, and after taking off the machine entered cloud and got off course; instead of crossing the coast at Lymington and turning West off the Needles, the pilot flew in too southerly a direction and the machine struck high ground five miles south-west of Newport, Isle of Wight. The pilot, the engineer and the radio officer were all injured, and First Officer G. K. Whitefoot was killed. There were no passengers aboard at the time of the accident. Laboratory examination of the aircraft's navigational instruments showed no defect.

S.A.A.B. SAFIRS REACH INDIA

THE delivery flight of three S.A.A.B. Safirs from Malmö, Sweden, to India, announced in *Flight*, April 29th, was successfully completed on May 7th. The Safirs left Bulltofta airfield, Malmö, on April 26th, and were expected to arrive at New Delhi at 0800 hours G.M.T. on May 7th. The actual time of their arrival was 10.00 hours G.M.T., and the fact that they were only two hours late after a journey of over 7,500 miles reflects great credit on the aircraft and pilots. The route chosen was Malmö-Geneva-Nice-Tunis-Tripoli-Cairo-Baghdad-Basra-Karachi-New Delhi. Captain Anders Helgstrand was in charge of the flight and the other two pilots were Mr. Arne Bartilsson and Mr. Stig Holmgren, who will remain in New Delhi as pilot instructors. Capt. Helgstrand will return by air to resume his duties with A.B.A. (Swedish Airlines), from which he was given leave for this delivery flight.

BREVITIES

Speaking in Montreal recently, Mr. G. S. Lindgren announced that the transfer of the B.O.A.C. maintenance base from Dorval to Britain should be completed by the end of the year.

* * *

On May 31st B.E.A. will start the first regular night passenger service between Northolt and Athens, where connections will be provided by Cyprus Airways to Nicosia and Istanbul. Vikings will be used and will leave Northolt at 23.57 hours, reaching Athens at 12.30 the next day.

* * *

At the request of the British Government a direct air service between Witwatersrand, Transvaal, and Madagascar is to be started. The South African Civil Aviation Council has agreed to Skyways, Limited, operating the service. It is understood that Lancastrians will be used for this route.

* * *

Mr. G. R. McGregor, president of T.C.A., has announced that by June 1st the last of the North Star aircraft on order for T.C.A. will come off the assembly line at Montreal. The introduction of the new machines will permit two flights a day across the Atlantic to Britain.

* * *

The figures for passengers carried by Aer Lingus during April, 1948, show an increase of 127 per cent on the April, 1947, figures. Over half of the traffic was carried on the London route, but the Liverpool and Manchester routes also showed substantial increases. On the Paris service 34 per cent more passengers were carried than in April, 1947.

* * *

As part of a scheme to bring airport equipment up to date, Spain has ordered some of the latest Marconi direction finding apparatus for installation at her principal airports. A recent order for airport radio apparatus covers the supply of two new V.H.F. direction finders and two H.F. direction finders. These, together with other equipment already supplied by Marconi's, are for installation at Madrid, Barcelona, Seville and Bilbao.

* * *

B.E.A. announce that all meals and light refreshments served on Vikings and Dakotas of the Corporation are now provided free of charge. Free meals were restored on the Continental services last April, and this concession has been extended to the U.K. internal services and applies to full meals as well as to sandwiches, snacks and beverages. It does not apply to mineral waters or drinks from the bar.

* * *

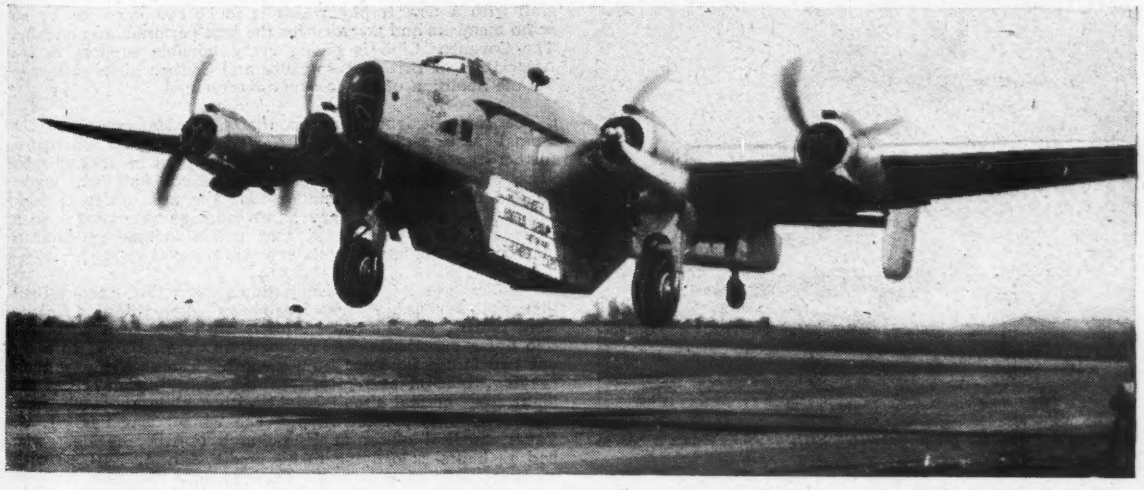
During the last quarter of 1947 majority owned subsidiaries of Pan American Airways flew 262,984,000 passenger miles, compared with 227,309,000 passenger miles flown during the last quarter of 1946. The total mileage flown was 15,213,912 and 13,884,836 aircraft miles during the last quarters of 1947 and 1946 respectively.

* * *

Arrangements have been made and came into operation on May 10th whereby pilots', navigators' and engineers' licences may be renewed in Scotland. This is announced in Notice to Airmen No. 173, and the address to which applications should be made, giving at least 14 days' notice, is the Divisional Controller, Headquarters, Scottish Division, M.C.A., Adamton House, Monkton, Ayrshire.

* * *

The general manager of the Union of Burma Airways, Mr. U Sway Tin, is visiting this country and hopes to engage pilots for six Doves which his company has ordered. He is also interested in acquiring aircraft spares and machine tools. During the war he served with the Fleet Air Arm as an engineer officer on H.M.S. *Indomitable*, and was awarded the D.S.C.



FRUITS OF HIS LABOUR : Slung beneath this Halton freighter is a specially designed packing case containing a new Humber car, which was recently flown from Bovingdon to Madrid. This car was purchased by Senor Cobarro Yelo, a Spanish fruit exporter and flown to Spain by British American Air Services ; the weight of the car and case totalled about 2½ tons, and there was only about a foot clearance between the case and the runway.

Civil Aviation News . . . . .

He is accompanied by U.B.A.'s chief engineer, who is taking a short course at de Havilland's, and will return to Burma on the first Dove delivery flight.

* * *

An air pact between Sweden and Pakistan has recently been drawn up and similar agreements between Pakistan, Norway and Denmark are expected to be signed shortly.

* * *

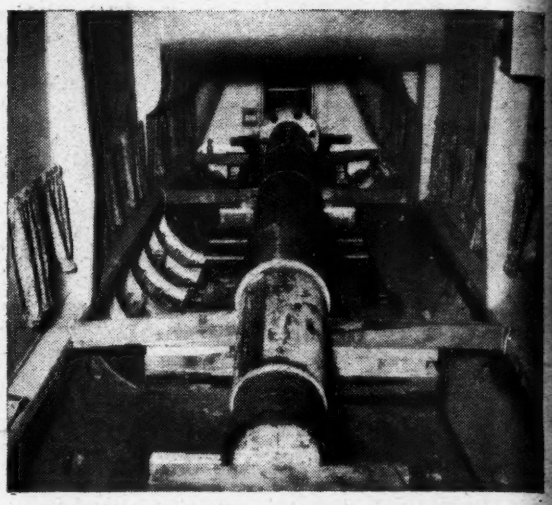
On May 7th a Scottish Airlines' Liberator took off on a charter flight from Prestwick to Calcutta. The aircraft was taking a ship's propeller shaft urgently required for S.S. *Clan Angus;* the weight of this shaft is 6 tons 7 cwt and its length is 19 ft 6 in. It is believed to be one of the heaviest single pieces of machinery yet carried by a British aircraft company. The Liberator flew via Rome, Cyprus, Basra and Karachi.

* * *

Pilots are warned of an obstruction in the approachway to runway 08 at Glasgow (Renfrew) airport. This obstruction is formed by cranes situated on the West bank of the River White Cart, approximately 200 feet above aerodrome level and 4,200 feet west of the end of runway 08. Aircraft approaching along this path should not descend below 350 feet above aerodrome level unless visual contact has been made with the ground. The cranes are marked with obstruction lights at night, and a middle marker beacon on the S.B.A. will be installed to indicate the position of these cranes.

* * *

Pan American-Grace Airways are expected to introduce express cargo flights daily between Miami, Balboa, Lima, Santiago and Buenos Aires in the near future. DC-6s will be used and the new service will allow approximately 7,240 lb of cargo to be flown each day. This service will enable freight to be flown from New York to Balboa in 10 hours, to Lima in 16, to Santiago in 21, and to Buenos Aires in about 24 hours. Special removable freight compartments on the DC-6s are intended to reduce the time taken for loading and unloading cargoes at the various destinations.



FLYING PROPELLER SHAFT: A new propeller shaft for the S.S. "Clan Angus" photographed inside the Scottish Airlines Liberator which flew it to Calcutta. The weight and length of the shaft are given on this page.

B.O.A.C. have recently made arrangements with Skyways, Limited, to charter Skymasters from that company for oil companies' traffic to and from Syria and the Persian Gulf. Because of the special nature of the traffic, B.O.A.C. have announced that it would be uneconomical to use the aircraft types available in the present fleet of the Corporation, and the chartering of Skymasters should secure a large proportion of the oil companies' air traffic besides a reduction of B.O.A.C.'s operating costs.

FROM THE CLUBS

JOHN WEBB has resigned his office of secretary to the Reading Sky Observers Club, and William Mackie has been elected to succeed him. Although membership of the Reading Sky Observers Club has dwindled recently, plans will shortly be announced which, it is hoped, will enable the club not only to survive but to increase its membership once more to a substantial figure.

* * *

During the last three months the Cambridge and University Aero Clubs completed a total of 493 hours' flying, which included a good percentage of navigation and cross-country work and practice in "spot landing." Mr. Woolridge, one of the club members, has completed his first solo, Mr. C. H. Webb, who has been flying with the club for over eight months, has taken delivery of his own Autocrat, and six other members have completed their "A" licence tests.

The approach of more suitable weather has enabled the Cambridge University Gliding Club to resume their towing activities in conjunction with flying clubs.

* * *

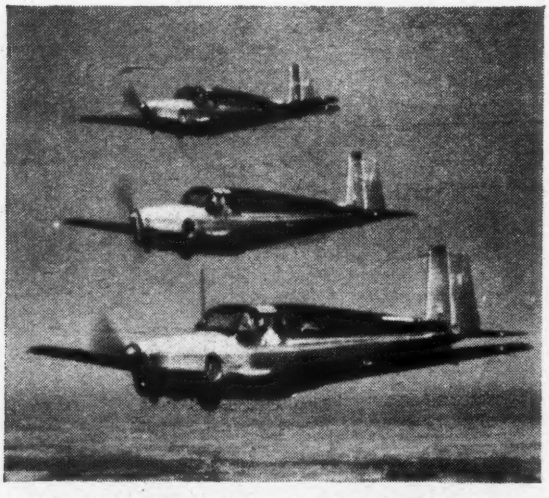
In order to cater for the increased membership and activities of the Coventry Aeroplane Club an Auster is being added to the fleet. *The Coventry Evening Telegraph* has presented the club with a new trophy which is to be competed for by *ab initio* members and awarded for the best performance annually. The Coventry Club is giving every possible support to the Association of British Aero Clubs and Centres in its campaign for the abolition of the tax on aviation fuel.

* * *

The New Zealand Minister of Defence announced at the annual meeting of the Royal New Zealand Aero Club that a further 150 Air Training Corps cadets would be trained next year. For this purpose a grant of £22,000 had been made. At the meeting it was stated that the aero clubs in New Zealand were losing money at an average rate of £1,000 a year, and it was predicted that unless further government help became available the clubs would cease to exist.

* * *

On May 9th the Herts and Essex Aero Club staged their first post-war Junior forced landings competition. Entries were limited to club-trained pilots with less than 20 hours' solo flying experience, and competitors were required to carry out two forced landings from 2,000ft. The accuracy of their taxying, take-off and return to the airfield, completing the flight from normal circuit height with a glide approach, were also taken into consideration. The winner was F/L. J. G. Vause, medical officer at Hornchurch R.A.F. Station, who had 14 hours' solo flying to his credit; Mr. A. Barbieri with 16 hours' solo came second. On May 23rd the next competition will be held; this will be for the Janet Lady Brickwood Challenge Cup, and is open to all pilot members. This also will be a forced landing competition. The club welcomes Mr. D. J. Parsons, who has joined the staff as charter pilot and assistant instructor.



FORMATING SAFIRS: Three S.A.A.B. Safirs recently flew from Sweden to India as reported elsewhere in this issue. The demonstration machine in England has been sold and a new one is expected to arrive shortly. It is possible that Mr. A. Duncan of R. K. Dundas Ltd. and Mr. R. Moore, the S.A.A.B. English chief test pilot, may bring the new demonstrator from Sweden.

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H.M.C.S. "MAGNIFICENT"—Deck-Landing Trials

AFT of the blunt cowling of the 2,500 h.p. Bristol Centaurus engine, the top line of the Sea Fury's fuselage sweeps up to the cockpit. Thus the pilot's field of view is improved for landing on the deck, the extent of which is clearly visible. The Sea Fury above is one of a pair seen below in company with two Fairey Firefly IVs, two Vickers-Supermarine Seafires and two Grumman Avengers, used for the deck-landing trials on H.M.C.S. *Magnificent* referred to on pages 546 and 547.

Intake Report

Napier Research and Development Work on Ducted Spinners for Gas Turbines

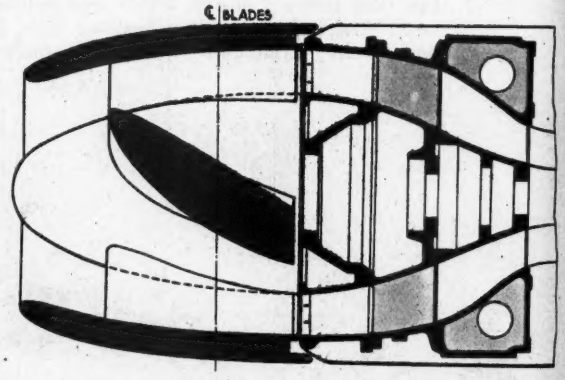
A REPORT issued by D. Napier and Sons, Ltd., states that the decision of the Napier Company to adopt a ducted spinner for their Naiad airscrew turbine engine was the result of an intensive programme of research and flight test work carried out at the company's Luton establishment on the Sabre Tempest annular radiator and ducted spinner installations. Full descriptions of the work and units were published in the July 25th and October 3rd, 1946, issues of *Flight*. The original decision to employ a ducted spinner in conjunction with the annular radiator was taken because it was expected that the improved intake efficiency of such a spinner would considerably decrease the cooling drag of the annular radiator system.

Heat dissipation of a radiator matrix is given by V^n where V is the matrix face velocity and n is approximately 0.8 for present designs of secondary-surface matrix. The matrix face velocity is proportional to the square root of the available pressure drop across the matrix, this, in turn, being directly proportional to the intake efficiency where the latter is defined as the total head at the matrix face above free stream static divided by free stream dynamic head; thus the heat dissipation of the matrix is proportional to $V^{0.4}$.

It is therefore possible by the use of an improved intake, such as that given by the ducted spinner, either to increase the heat dissipation of a given matrix, or to decrease the cooling drag for the same heat dissipation. To take a practical example, it may be assumed that the efficiency of a conventional annular intake behind the airscrew disc is 75 per cent and the efficiency for a ducted spinner used with the same installation is 95 per cent; then the heat dissipation of the radiator system will increase by 10 per cent.

Initial tests with an annular radiator had already resulted in an overall cooling drag reduction of 8.8 per cent compared with the orthodox underslung radiator on the Sabre Tempest, and further tests showed that, with the ducted spinner, the improvement indicated in theory was obtained in flight. Against the improved intake efficiency, however, the increased weight of the ducted spinner had to be offset but, even so, it was shown that there was a balance in favour of the ducted spinner. A further feature of this form of intake is the ability to undergo protracted ground running and taxying without overheating, owing to the fan effect of the internal blade fairings; these induce considerable airflow through the radiator system under static conditions.

The improvement in intake efficiency obtained with the ducted spinner over that of the conventional intake may be explained as follows: With the conventional entry, the intake losses are made up of duct losses and losses over the airscrew blade roots. With many modern airscrews, the blade root section at the spinner periphery is not always of ideal aerodynamic form and, with the high-speed entry, that is, an entry in which the ratio of entry velocity to free stream velocity is greater than about 0.6, the losses over the blade roots of a thick section can be considerable. With a low-speed entry, but with the same thick-section



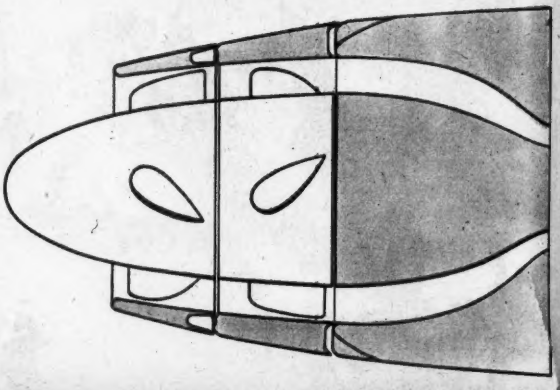


Fig. I. General arrangement of long-chord ducted spinner with truncated root fairings for the airscrew blades.
Fig. II. General arrangement of short-chord ducted spinner with full-scale aerofoil root fairings designed for a contra-rotating airscrew.

blade roots, the losses still remain high, owing to the fact that the thick sections are operating in an adverse pressure gradient by the slowing-down of the air ahead of the entry. With a ducted spinner, the slowing-down of the air takes place entirely outside the spinner, and a low velocity is obtained over the blade roots without the disadvantage of the adverse pressure gradient.

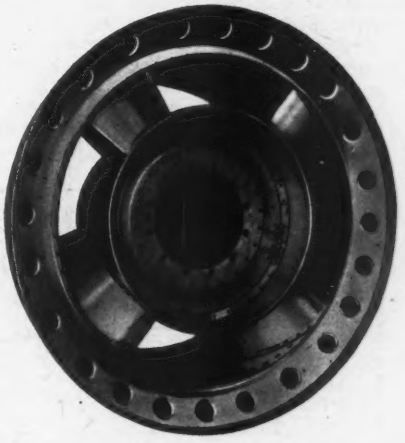
The Napier development tests of the Tempest showed that, even with the blade root section that could be employed with the large diameter conventional spinner, an improvement with the ducted spinner was obtained. It was realized, in the initial stages of the design of the Naiad engine installation that, due to the very small diameter of this engine and the consequent small diameter of the airscrew spinner, the thickness/chord ratio of the airscrew blade roots would be considerable, probably of the order of 80 per cent. The employment of a conventional entry for this engine would, therefore, be accompanied by high losses over the blade roots, no matter whether a high-speed or a low-speed entry was used. It is of interest to note that power losses incurred when using a conventional spinner in preference to a ducted spinner are 2.6 per cent and 3.3 per cent respectively at 250 and 350 knots.

Front and rear aspects of the full-scale short-chord ducted spinner designed for the Napier Naiad.

Model Testing

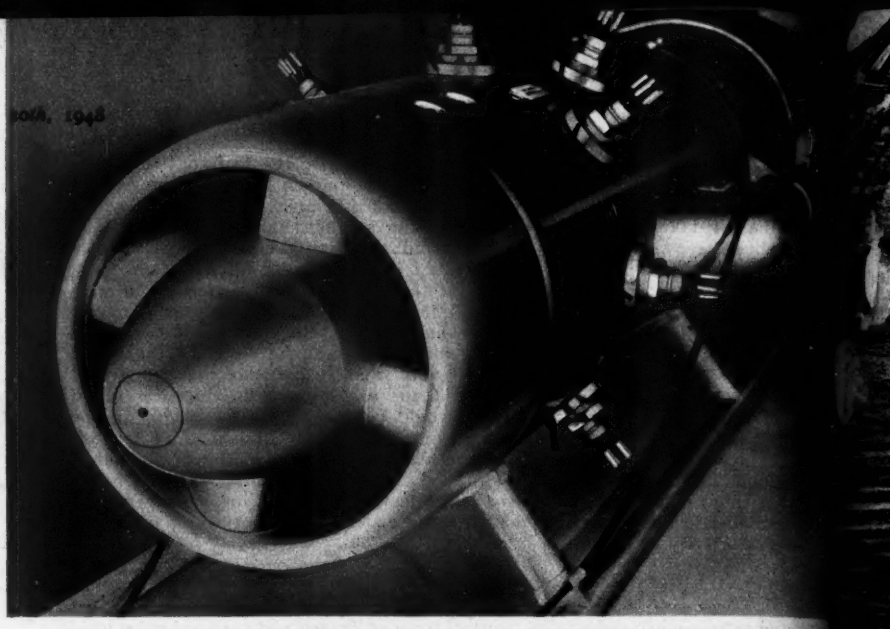
As a result of the information obtained from the Sabre Tempest installations previously mentioned, several types of ducted spinner were considered in the early stages of the Naiad design, and an exhaustive series of model tests was carried out in conjunction with the R.A.E. at Farnborough. A three-eighth scale model of the Naiad was designed and built at Luton and the flow tests were started in the 5ft wind tunnel at Farnborough in September, 1946. The tunnel test conditions were arranged to reproduce in the model the two main parameters of operation, viz., (a) the ratio of the spinner entry velocity to the free stream velocity, the value of which in the full-scale engine with ducted spinner ranges from 0.3 at sea-level maximum cruising to 0.5 at maximum climb at 20,000ft; the corresponding figures for the conventional spinner are 0.4 and 0.75 respectively. This ratio governs the airflow pattern at the spinner entry and around its outer surface and has a considerable effect on the duct losses. (b) The angle of attack of the blade root fairings, which is a function of tan ϕ where $\tan\phi = \frac{V_a}{\pi n D_s}$ where V_a is the local velocity of the air at the airscrew centre line inside the ducted spinner, n is the speed of the spinner in revs per second and Ds is the mean diameter of the duct at the airscrew blade centre line. The value of tan ϕ in the tests was varied from 0.6 to 1.9 by suitable adjustments of spinner speed, tunnel air speed and engine airflow. The actual full-scale value of tan ϕ occurring in flight varies from 1.3 to 1.5. The results of these tests are briefly summarized in Figures III and IV.

In Figure IV is shown the percentage recovery of dynamic head at the compressor entry due to forward speed for cruising and climbing conditions at 20,000ft, as a function of the dynamic head for the different types of



The heading photograph and that below show with admirable clarity the appearance of the long-chord ducted spinner developed on the Sabre Tempest.

INTAKE REPORT . . .



A short-chord ducted spinner on the ¼-scale Naiad model with which tunnel tests were performed.

spinner under test. This value of air intake efficiency is defined as the existing total head at the compressor entry above free stream static, divided by free stream dynamic head. It may be noted that all the ducted spinners show a considerable improvement in efficiency over the conventional type, thus bearing out the theoretical arguments.

In the case of the long-chord spinner with circular blade root fairings, however, this improvement is less marked. At low values of tan ϕ, this type of spinner shows a very high percentage of dynamic head recovery, owing to the fact that the blade root fairings were set about 8 deg. coarser than for the short-chord spinner. Over normal operating conditions, however, values of 1.3 to 1.5 are experienced, so that the large gain of the long-chord spinner will not be experienced in practice. In the normal operating range, the short-chord spinner possesses a slight advantage, added to which it has the attraction of being 10 lb lighter. The curves for these two designs should not be compared too closely because of the 8 deg. difference in their fairing setting angles: nevertheless, a direct comparison is possible by shifting the curves bodily with regard

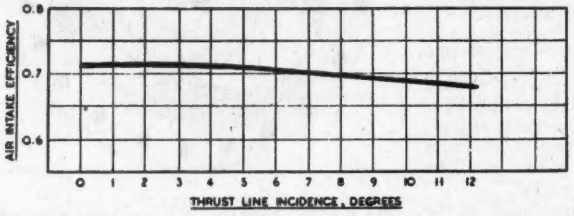


Fig. III. Performance curve for short-chord ducted spinner showing air intake efficiency against thrust line incidence for climbing conditions.

to each other by an amount corresponding to 8 deg.

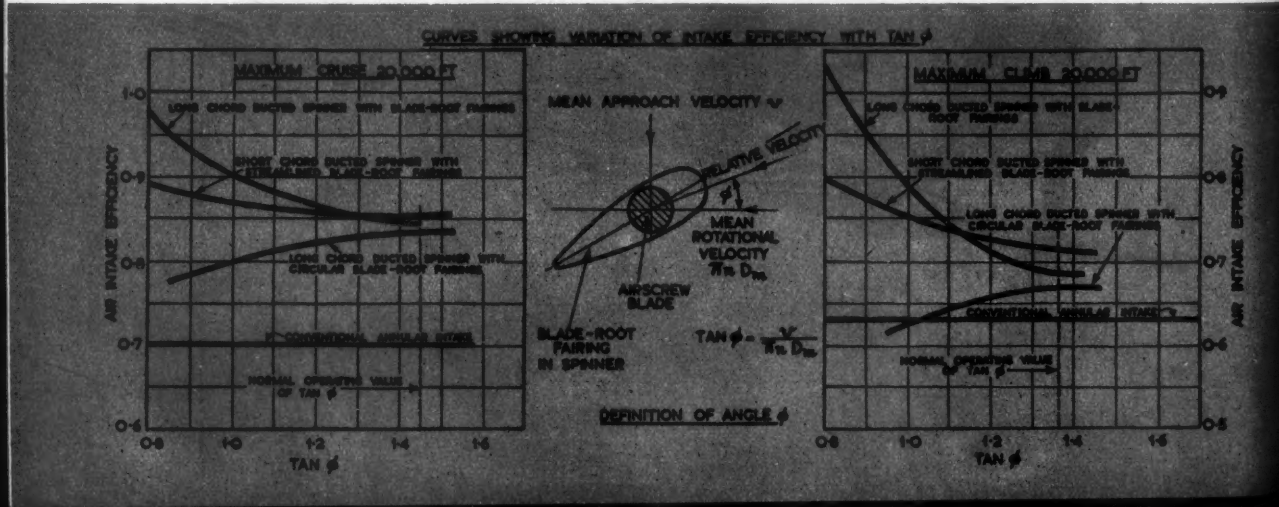
Figure III indicates that the loss in recovery due to the incidence of the model is very slight up to angles of 12 deg. In the design of the Naiad, as represented by the model, the losses caused by the duct passages through the engine gear box were measured, and improvements in the duct design showed that the intake efficiency of the ducted spinner was increased to 94 per cent, whilst the efficiency of the conventional entry was also improved to 80 per cent. It was not possible to reproduce the full-scale Reynolds Number which, under test conditions was about one-tenth full scale. A limited number of tests were, however, carried out representing a Reynolds Number range of 2:1 to give the trend of scale effect on the two ducted spinners with blade root fairings. The indication was that, in both cases, the full-scale spinners should have a better performance than that given by the models, but this improvement would probably be less marked in the case of the long-chord spinner due to its lower t/c ratio.

From these tests, it was considered that the short-chord ducted spinner would prove to be the most efficient, and designs, which were started in January, 1948, were completed for spinners for the Naiad engine. Constant Speed Airscrews, Ltd., who worked in co-operation with Napiers on the original Sabre ducted spinner trials, undertook manufacture, and several spinners, both for test-bed running and flight development, have been delivered.

A model of a contra-rotating ducted spinner has been manufactured, the general arrangement for which is shown in Figure II. Tests on this ducted spinner have been completed and have shown that, whilst a considerable improvement over the conventional entry behind a contra-rotating airscrew is still evident at climbing speeds, that is, conditions corresponding to high values of entry velocity ratio, the gain is less marked at cruising conditions.

The advantages to be derived from the use of ducted spinners were apparent in the early stages and, at the request of the Ministry of Supply, Napier's designs were made available to the airscrew industry. The adoption of ducted spinners for other makes of airscrew turbine has previously been announced in *Flight*.

Fig. IV. Comparative curves showing percentage recovery of dynamic head at the compressor entry for the different types of spinner tested.



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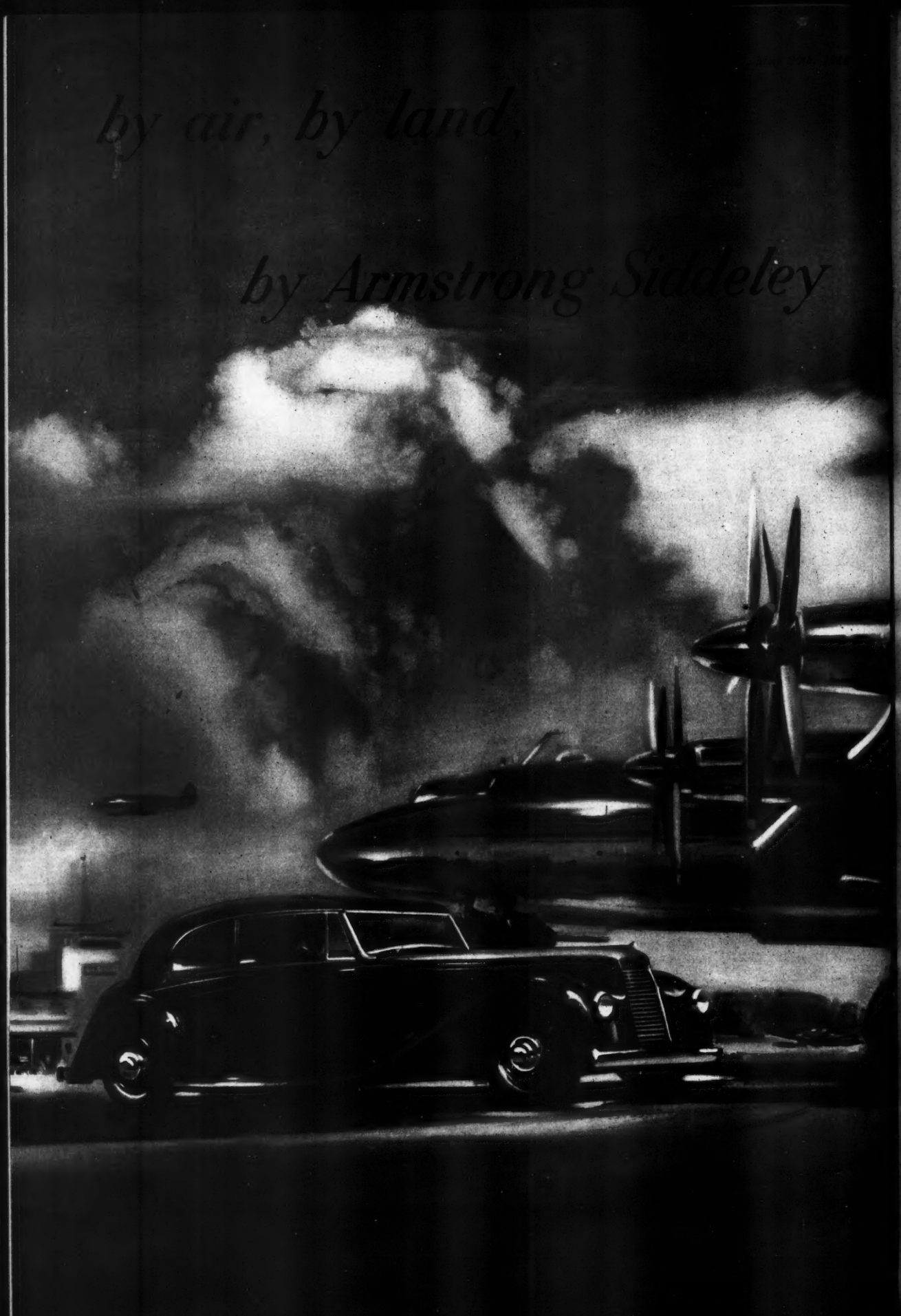
by air, by land,
by Armstrong Siddeley

What are the Chances?

Some Thoughts on Short-Service and Permanent Commissions, and the Qualifications Desired

By R. C. O. LOVELOCK
—W/C., R.A.F.O.

WHATEVER hardship may be caused inside the service by the renewal of the Short-Service aircrew policy, it would be as well if those who hope to get commissioned as Short-Service G.D. Officers, and later aspire to permanent commissions, could be given some idea of what their chances are, and by what standards their eligibility will be judged when the time comes. The Royal Air Force, alone of the fighting services, seemed unable, during the war, to give commanding officers an intelligent idea of what aspect to approach the problem from. I am particularly referring to the commissioning of aircrew, and the selection of such officers for permanent commissions after the war.

When I entered the R.A.F. with a Short-Service Commission in the G.D. branch in 1936, it was laid down that each entry would have one chance of selection for a P.C. by a written examination and their C.O.'s recommendation, during their last year. The 1936 entries never sat for their examination because these were cancelled in 1939, and selection started again in 1944 from the whole surviving non-regular officer strength, but the age limit was then 30 years on January 1st, 1944. Therefore, any such officer who entered the R.A.F. in or after 1936, and who was born before January 1st, 1914, as I was, had never been eligible for a P.C. I served the R.A.F. through its ten most cataclysmic years under a complete misapprehension that the Service would abide by its recruiting promise of one fair chance for each entrant.

When my application was refused the reason given was that the need for a proper age grouping of successful candidates placed an unavoidable limitation upon the number of older officers who could be absorbed. Some older officers have been absorbed, but in this very narrow field the particular "cleft stick" group to which I belong has had to compete with those senior to 1936 who must, therefore, have already had one chance before the war. But even in this doubly-slender chance, it is hard to understand why the horse I backed didn't come home, and this makes me wonder by what standards the selections were made.

Sorts of Discipline

Before joining the R.A.F. I had seen seven years in the Merchant Navy, and some periods of service with the peacetime Royal Navy as a R.N.R. Sub-Lieutenant. I was familiar both with the sort of discipline which makes men work, and that which makes them fight. Everybody knew that the R.A.F. must have its own special kind of discipline, but nobody seemed to be very clear what it should be like. The simple patriarchal military virtues of courage, justice and affection that were found in the regimental officer of history, and which in the Royal Navy had been superimposed upon the age-old sea discipline ("Pump you beggars, pump!") seemed difficult to fit within the R.A.F. framework. Yet if one could find the right formula, now that the war had stopped that dreadful examination, the war years, if spent in following that ideal, ought to produce a perfect G.D. officer with a P.C. "in the bag."

This was my reasoning in 1939 and early 1940. In all mechanized branches of the armed forces technical training had often to be insisted upon at the expense of military training, and the unspoken resistance to military ideas was always aggravated in the R.A.F. (at least before the advent of those brave fellows, the R.A.F. Regiment and the Servicing Commandos) by the fact that the airmen would never have to fight. Yet the service was full of men who were unused to military restraints and authority, and the only justification for holding them in that restraint was the foundation of military law, under which fighting men could be controlled.

From the point of view of the officer himself, flying, fighting, overseas service and the command of men would seem to be the attributes and experience most likely to fit him for the position of an officer in such an organization. They were the fonts from which he must drink most deeply. Following this theme, one developed a clearer vision altogether. The only real justification for rank was responsibility for men; one had to distinguish between being an officer or an office-holder, by which I mean filling an establishment without the corresponding contact with the number it was worth. In the same way, the only justification for wearing wings was to be still capable of flying an aircraft of some sort. Another exacting precept of the pure military philosophy was that one might never order a subordinate to do a thing that one could not or would not do oneself. Obviously it had to be confined to the things in which one was trained, to one's own branch or trade, but where there was any danger in it, it had to be embraced utterly.

Leadership in Small Doses

In circumstances where airmen didn't fight, and aircraft operated singly, as in the Coastal Command A/S squadrons, there was only too little scope for the exercise of these basic qualities of leadership. A Wing Cmdr. O.C. of a boat squadron, for instance, might have three or four hundred all told under his command, but not more than twelve at a time could comfortably be taken into action, even in a Sunderland. The distinction sought in actual operations must be balanced by a really zealous and human administrative ability on the ground. The responsibilities of even the most junior section officer, when investigating a charge, in representing the law were enormous. This dualism always made one compare unfavourably with those gallant fellows who lived only for operations, and one admired them, too, but that cult alone was not the answer to the make-up of the perfect G.D. Officer.

In late 1944, with the invasion well launched, service in S.E. Asia was often spoken of as a dreadful possibility, and a few junior staff officers at least were frantically busy screwing their chairs to the floor and calling for larger establishments. But with such a tremendous slice of the British Empire still in enemy hands, no man, married or single, who was trained to fight could dismiss this fact easily.

I then thought I would try my hand at "Whispering Death" (the "Rocket Projectile Beaufighter"), and was given a squadron in the Arakan. On those jungle strips, denied all contact with civilization and the lure of the "48," the ground crews were closer to the flying men than ever I have seen. "Is your hut all right, sir?" said a voice in the semi-darkness when the M.O. and S.W.O. were helping blaspheming erks to extricate themselves from a 40-bed basha which had collapsed in a cyclone. "Flat as a pancake," I was glad to reply, "they have no respect for rank in heaven!" Even so, much more could have been done to limit the demobilization unrest which brought no credit to the R.A.F. in S.E. Asia and cannot be condoned, if only the principles which govern men had been better understood by more officers within units.

The pursuit of this ideal of service led me through three tours, and the command of four operation squadrons, yet it wasn't what the R.A.F. wanted. When I appealed constitutionally against my rejection, I was greeted with the same old bureaucratic imbecility, "The Need for a Balanced Post-War Air Force, etc." It just wasn't true, because at least two more senior officers contemporary with me have since been surreptitiously re-absorbed after demobilization. Ominously enough, neither replied to my letters.

TOWARDS GREATER AIR SAFETY

An Analysis of Some Recent Air Accidents With Suggestions for Reducing the Risk of Fire in Aircraft

By W. A. HANNAN

AT the present moment public attention, even amongst sections of the public who are not directly interested in aviation, is concentrated on air safety. This is reflected in the editorials, articles and correspondence columns, both of the technical and lay Press. The loss of *Star Tiger* has focused attention on civil air-line operations, more than usually perhaps, because of the mystery surrounding the disappearance of this aircraft. Recent discussions on the subject of aircraft accidents, however, have been concerned mostly with the safety devices provided for the use of passengers, like escape hatches, safety belts and parachutes, and have not taken into account the fundamental causes of air accidents or their ultimate results.

To examine the details of any accident in their proper perspective it is necessary to consider each factor leading up to it and the effect it has on the next successive event, before either a true and fundamental cause can be deduced or a remedy found to prevent recurrence. It is essential, therefore, to differentiate between the prime cause of the accident, which may even lie in the design of the aircraft, and the immediate and obvious result of that cause, which is too often wrongly blamed for the crash, especially by those with insufficient knowledge of the case.

If any useful knowledge is to be gained from the study of accidents, the cause of the crash must be examined separately from the result of it, and herein lies the main failure of accident statistics to provide accurate data for research into accident prevention. To do this, the overall story of the accident must be divided into separate causes and contributory causes, together with their individual effects, so that one can say, with certitude, that if this or that had been done, and something else had been taken into consideration, so many lives would have been saved, or the aircraft might, indeed, never have crashed—the ideal at which to aim.

Such analyses are made in the findings contained in the reports of the Inspector of Accidents, but unless these are widely read by everyone, from designers to pilots and ground crews, the accident rate will grow rather than diminish, simply through failure to profit by the lessons of experience.

To illustrate these points, first, a bare analysis of aircraft accidents in the U.S. is quoted below in Table I, which information has been obtained from the columns of the American journal *Aviation Week*. It gives the results (*not the causes*) of 7,620 accidents to civil aircraft, which involved deaths or injuries, during 1946, in which year 9,425,000 hours were flown and logged, and was published by the Accident Bureau of the Civil Aeronautical Board.

TABLE I
Classification of Accidents during 1946 (U.S.A.)

Type of Accident	Number	Approx. Percentages
1. Landing accidents	2,592	34.0
2. Forced landings	1,372	18.03
3. Collisions with objects other than aircraft	1,261	16.57
4. Taxying accidents	790	10.37
5. Stall/spin accidents	760	9.98
6. Take-off accidents	567	7.44
7. Structural failure in flight	49	0.64
8. Collisions between aircraft	45	0.59
9. Propeller accidents	53	0.67
10. Fire accidents	24	0.31
11. Miscellaneous	64	0.84
12. Undetermined	43	0.56
Total	7,620	100%

If these figures are considered without reference to the other data published in the same report, a totally wrong impression of the causes of aircraft accidents may be formed. We might assume that more than 50 per cent of all aircraft accidents were due to forced landings or to crashes on landings, and that a sixth of all accidents were due to aircraft flying into things. This would indicate a high rate of mechanical failure and very bad navigation. To obtain any accurate findings, it is necessary to analyse a relatively small number of accident features in much greater detail. In doing this, the difficulty is to pick a representative group without bias: otherwise by carefully choosing enough accidents of a certain type the statistics can be made to give almost any desired answer. To avoid this, a table of accident statistics is given opposite, compiled from reports published in *Flight* since the beginning of 1948. Data are taken from the weekly news feature, *Civil Aviation News*, which publishes the findings contained in reports issued by the Inspector of Accidents. Authority for the remarks made in the column headed "Contributory Causes" is identified with the latter reports where they have been issued. This was considered to be a fair way of making a random selection, and deals with fatal accidents only.

PUBLICATION of letters concerning the use of diesel engines in civil aircraft led us to comment, on May 6th, on the use of so-called safety fuels as a shorter cut to immunity from fire.

Although several American oil companies have produced fuels of this nature in experimental quantities, the absence of a demand from operators appears to have resulted in further work being confined to the laboratories.

The present contributor makes a strong plea for using flexible fuel cells in civil aircraft, rather than attempting to develop the diesel. We would suggest that crash-proof tanks plus safety fuels should to all intents and purposes eliminate the fire risk.

Having stated a main cause and contributory causes, a comparison must be made between the immediate cause of each accident and the first cause from which the immediate cause followed. The result appears in Table II.

In Table III weather conditions are blamed for 5 out of 14 accidents, mechanical failures next with three causes, and pilots' errors two causes, but in Table IV pilots' errors are increased to no fewer than ten causes. There are three unknown causes and only one mechanical defect in flight, after which, be it noted, the aircraft landed safely 300 miles farther on!

Why, then, has the human element been blamed for all these accidents and how is the reduction in mechanical failure from three to one accounted for? The columns in Table II give the following reasons:—

[Accident No.] [Pilot blamed for:—]

*(1) Failing to have proper maintenance carried out on a private aircraft.
(2) Failing to maintain sufficient height in bad weather.
(3) Having permitted overloading of the aircraft.
(4) & (8) Dangerous low flying.
(6) Trying to take off from too small a field.
*(7) Faulty approach technique resulting in bottom of hull being damaged.
(9) Failing to take alternative, safe route.
(13) Failing to divert to fog-free aerodrome.
(14) Error of judgment in coming in to land too low.

* *Previously blamed on mechanical failure.*

TABLE II.

	Date	Accident to	Location	No. Killed	Cause of Accident	Contributory Causes	Details of Accident
*1	16.4.47	Proctor (Private) ...	Off Normandy Coast.	3	Engine failure (reported)...	Pilot's error in handling fuel cocks (possible). No pre-flight or minor inspections.	Crash in sea. One passenger picked up.
*2	29.4.47	Airspeed Consul ...	Limpsfield, Surrey	2	Pilot's error in failing to maintain sufficient height in low cloud.	Possibly pilot's inexperience, also that of radio op. Bad weather a possibility.	Crashed into wood on high ground in low cloud.
*3	14.6.47	Aerovan (Charter)	Croydon ...	1 (Pilot)	Pilot's error in trying to climb too steeply. Pilot inexperienced.	Overloaded condition of aircraft.	Aircraft took off, flew tail down for ¼ mile then turned and crashed after hitting tree. A/C disintegrated.
*4	June, 1947	Auster (Private) ...	Sywell	1	Pilot's error of judgement in dangerously low aerobatics.	—	Hit ground in dive following stall turn at 150ft.
5	3.7.47	Anson (A.T.A.) ...	Off I.O.W. ...	2	Not known	Sea-fog off I.O.W. at time of crash.	Crashed into sea, about time when tanks would be exhausted.
6	8.47	Auster (Private) ...	High Brixham, Devon.	1	Pilot's error on take-off ...	Unfavourable conditions ...	Taking-off from small field, struck hedge with port wing.
*7	23.8.47	Sandringham (B.O.A.C.)	Bahrein, Persian Gulf.	10	Starb'd side bottom plating collapsed.	Error of judgment of pilot.	A/C sank after alighting, due to heavy loading collapsing part of underwater structure.
*8	9.8.47	Auster (Private) ...	Shanklin, I.O.W.	3	Dangerous low flying ...	Pilot's inexperience and lack of skill.	Crash into sea after attempting to shoot-up a speed boat.
*9	Aug., 1947	B.S.A.A. Lancastrian.	S.A. Andes ...	12	Possible icing up and hitting mountain.	Pilot's inexperience as captain (should have picked safer route). Three routes available.	No wreckage found. A/C was in good condition and was flown by first-class war-time pilot. (D.S.O., D.F.C., B.E.M.).
10	30.1.48	Tudor IV. "Star Tiger." B.S.A.A.	Atlantic Ocean, Nr. Bermuda.	35	Unknown	Unknown	Unknown.
11	7.2.48	Constellation (Eastern Airlines)	In flight (22,000ft)	1 (Steward)	Airscrew blade of inb'd starb'd engine broke away and penetrated fuselage.	—	Aircraft landed 300 miles further on with no flaps, and outb'd starb'd engine only controllable by ignition. Presumably inb'd starb'd engine stopped and airscrew feathered.
12	21.2.48	Latecoere 631 (on test flight).	Normandy Coast	19	Bad weather –	No de-icing equipment ...	Crashed in sea in snow storm no witnesses.
13	2.3.48	Dakota (Sabena) ...	Heath Row ...	20	Crash during G.C.A. landing.	Bad visibility (200 yds) ...	Aircraft crashed on runway and caught fire. Passengers unable to get out.
14	15.4.48	Constellation (P.A.A.).	Shannon Airport	30	Pilot's error in coming in too low.	Poor visibility	Hit wall, lost undercarriage, made belly landing. Tanks burst, aircraft caught fire.

* From report by Inspector of Accidents.

This method of assessment shows that errors of judgment and lack of skill or experience accounted for 10 out of 14 accidents and mechanical failure for only one, the remainder being due to unknown causes.

Since it is unlikely that the human factor of error will change much in the near future, let us now examine the actual results of the accidents for any remedy which can be applied to save the lives of the occupants of crashed aircraft.

Over 50 per Cent at Sea

By reference to the facts in Table II we can show what happened in each accident (where known), how many people were killed and from what cause. This shows that a total of 140 deaths in the 14 accidents was made up by 72 lives lost at sea (51.4 per cent), 50 through fire after crash-landing (36 per cent), 17 through the impact of the crash (12.2 per cent), and one through mechanical failure in flight (0.7 per cent). The largest individual total (lives lost at sea) is made up of accidents due to a variety of causes, but they indicate that improved navigational aids,

TABLE III
Immediate Cause of each Accident

Category	No. in Table II	Total
Bad weather conditions	2, 9, 12, 13, 14,	5
Mechanical failure in flight ...	1, 7, 11	3
Dangerous low flying	4, 8	2
Unknown causes	3	1
Overloaded aircraft	6	1
Pilot's error of judgment	5, 10	2

TABLE IV
Original Basic Cause

Category	No. in Table II	Total
Pilot's error	1, 2, 3, 4, 6, 7, 8, 9, 13, 14	10
Unknown	5, 10, 12	3
Mechanical failure ...	11	1

particularly for aerodrome approaches, and more accurate weather forecasting will be required to reduce the number of similar losses in the future. It still remains the responsibility of airline operators, and particularly of captains and pilots of aircraft, to put safety considerations first, and to act on the advice given by ground controls at the terminal and intermediate points on the routes as to the advisability of making a detour to avoid bad weather areas. Battling through the elements at all costs may be good publicity for stunt fliers (if successful), but it is bad business for commercial flying. The standards of workmanship of ground crews must be maintained at the highest possible level with regular and careful inspection to ensure airworthiness.

In the next category, with 50 lives lost in two accidents through fire after crash landing, the remedy is neither hard to find nor difficult to apply. It is simply to make the fuel tanks sufficiently crash-resistant to prevent them from bursting in any crash in which the occupants of the aircraft can have reasonable chance of survival.

Crash-proof tanks of the flexible type are made which are sufficiently strong, when fitted in structures adapted

(*Concluded on page 559.*)

Air-India International Demonstrates New Equipment and Announces Plans

ONLOOKERS at London Airport are no longer thrilled by the elegance and performance of the Constellation. Almost weekly the type becomes more common. Lately, however, they have spared more than a passing glance for the red and silver splendour of *Rajput Princess*, one of three Model L.749s acquired by Air-India International for the Bombay-London service.

The *Princess* was engaged last week in making the second two-way proving flight over the route (by way of Geneva and Cairo) and an opportunity was taken of sampling her comforts and conveniences. Like her sister ships, *Mogul Princess* and *Malabar Princess*, she is laid out as a 40-seater and, though bunks are installed, these will not normally be used. A partition divides the cabin into two compartments and effectively dispels the "tunnel" impression characteristic of the Constellation's interior. A purser and hostess are carried, but regrettably it has proved unpractical to attire the lady in a picturesque *sari*.

The pilots, radio operator and flight engineer are housed snugly, if not luxuriously.

Conversation with Mr. S. K. Kooka, traffic manager of Air-India International, and Captain K. Vishwanath, pilot of *Rajput Princess*, brought new information on the composition of the company and its proposed operations. Like others in India, the company is not nationalized, but the Government of India have a 49 per cent holding, with the option of a further 2 per cent. The domestic company—Air-India—are managing agents.

London-Bombay in 23 Hours

One more proving flight will be undertaken, late this month, before the first regular service leaves Bombay on June 8th, arriving at London Airport on the following day. The inaugural eastbound service is scheduled for June 11th. Westbound, the time for the trip is 26 hours, inclusive of stops; eastbound, 23 hours. For the first four or five weeks the frequency will be one service a week, but eventually there will be two trips weekly. The London-Geneva legs will normally be flown at 6,000-9,000ft; Geneva-Cairo at 12,000-14,000ft; and Cairo-Bombay—the longest stretch—at 19,000ft or so.

Captain Vishwanath, like other Constellation captains, is full of praise for his aircraft. He demonstrated the Curtiss reversible-pitch airscrews, both on leaving the parking area and during the landing run; the amazingly short take-off (about 13 seconds with light load); high initial rate of climb (1,200 ft/min) and cruising speed (275-285 m.p.h.). In the cockpit one watched the rate-of-descent indicator unwinding at 2,000 ft/min, though the pressurizing prohibited aural indication of the rapid change of height.

The captain is 32 years old. He learned to fly on Miles Hawks, with Phillips and Powis, at Reading, and took his commercial licence at Croydon during 1936. Returning to India, he joined the Tata organization and was engaged in the Empire air-mail scheme. Lately he has visited America for conversion on to the Constellation, and spent three months at

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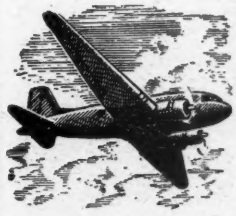

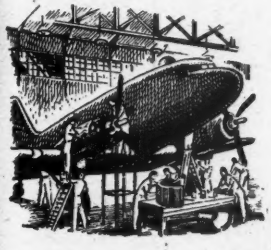

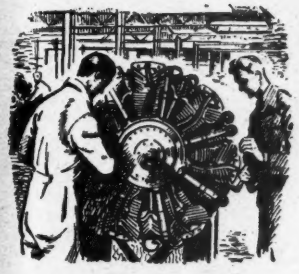

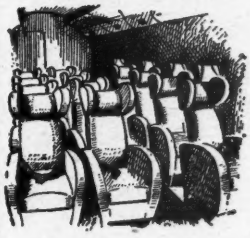

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Rajput Princess at London Airport . . . .

Mr. S. K. Kooka, traffic manager of Air-India International and Captain Vishwanath.

the Lockheed and Wright factories before delivering a "Connie" from Burbank to Bombay. Having logged over 9,000 hours—latterly on Vikings and Dakotas—he has been promoted from chief pilot to the office of flight superintendent.

As an indication of the solicitude of A.I.I. for their passengers, the following excerpts from a booklet handed out on their aircraft are quoted:—

"In India some men sport their women-folk, others disguise them as the Ku-Klux-Klan. We have an open mind on the subject, but if you favour segregation and a mosquito curtain over the head of your beloved, it makes things a little difficult in the cabin of the 'plane. We have no separate compartment for yashmak'd ladies to frolic in, but if you insist, we can arrange for her to be taken for'ard with the crew, where the skipper, his mate and the Radio Officer, all God-fearing men, will take good care of her."

"Before you leave the 'plane at destination, please look around to see if you've forgotten anything. Better still, look around in case the other passengers have left something behind, which you can then transfer, deftly, into your trousers pocket. Our Directors all wear watches which our passengers originally purchased."

From the tough ones who never suffer from air sickness, a small favour is asked: "When your fellow passenger is a little under the weather, don't regard him with amusement or contempt. Don't gaze fascinated at his green cheeks. Pretend you haven't noticed a thing, and when the going is particularly heavy, comment casually on the birth rate or the Balkan situation, without as much as a glance at him."

TOWARDS GREATER AIR SAFETY

(Concluded from page 557)

to suit them, to withstand the violent stresses of a crash up to and beyond the point where the aircraft occupants would be killed by impact alone.

In neither accident would lives have been lost if the aircraft had been fitted with reliable crash-proof tanks, for neither the impact of hitting the ground nor the subsequent deceleration were sufficiently severe to cause the aircraft to disintegrate. The occupants, although they may have been injured, would have been rescued by ground personnel, both aircraft having crashed on airfields where rescue equipment was available, together with fire-fighting appliances which could deal with any smaller fires round the engines which might have developed. It may be said, therefore, that in this category all the passengers and crews should have been saved, and the fact that 50 lives were lost can be blamed on bad design. No aircraft should be allowed to fly with a built-in fire hazard of extremely vulnerable tanks which will almost certainly be damaged in the event of a forced landing, for no aircraft is sufficiently reliable for its designers to say that none of the type will ever have to make a forced landing or to assume that their pilots will never make an error of judgment in landing.

Other forms of transport, such as shipping, railways and even road transport, with all its diverse types, are strictly controlled by safety regulations which have to be adhered to, and civil aviation would benefit in the long run from regulations framed expressly to ensure a standard of safety which would enable passengers to get out of an aircraft after a crash landing. Modern motor cars, for instance, have fuel tanks positioned in the least vulnerable place, and saloon bodies have strong steel roofs which protect passengers in the event of overturning. The accident rate for cars is high, but the number of fires resulting is very small. Manufacturers build safety into their products and use it as a selling point, and the same attitude would do more for civil aviation than knocking half an hour off a transatlantic crossing due to the improved performance of the aircraft.

Of lives lost through impact one can say little, except that the accidents are not often the fault of the aircraft. They are caused mainly by flying into the ground at high speed, due generally to pilots' or navigators' errors in failing to maintain correct course or sufficient height, coupled frequently with bad weather conditions. The duty of crews is to allow a sufficient margin of clearance over high ground and to put safety before schedules at all times; in other words, to use an alternative course at the expense of cost and loss of time.

In the final category (mechanical failure in flight) the remarkable feature of this is that it is such a low percentage of the total. Aircraft generally are now very reliable, and given proper maintenance and overhaul, the losses due to mechanical failure should be almost negligible. It is worth noting that in the American analysis structural failure in flight is blamed for only 49 of 7,620 accidents, or 0.64 per cent.

To sum up, then, from the accidents reviewed in detail: first, improvements could be made in navigation and ground/aircraft control, (a) to avoid known hazards on the flight route, and (b) to divert aircraft to safer airfields or along different routes to avoid bad weather.

Secondly, the greatest reduction in the number of lives lost in crashes can be obtained by reducing the fire risk. This should be done by using safe tanks rather than safe fuels, as the change-over to diesel engines and fuels would take many years, largely because aircraft diesel engines have never been so intensely developed as petrol engines.

Thirdly, crashes which cause death through impact are generally so severe that safety regulations applied to the aircraft would be of little value. Here the only way to reduce fatalities is to avoid the crashes, which may well be done by applying the first summation.

Fourthly, aircraft are proved to be very reliable mechanically and the accident rate could not be much improved by even the total elimination of mechanical failure.

ACCELERATED HELICOPTER TESTS

WRIGHT Field, the U.S. Air Forces test establishment, is to carry out a rigorous 100-hour accelerated service test of the Doman-Frasier rotor mounted on a standard Sikorsky R-6 helicopter in order to discover quickly "the structural integrity, performance and durability of the rotor and control system under rough handling and extreme flying conditions," the firm states.

Details of the Doman-Frasier rotor head were published on February 5th. It may be recalled that the rotor is a four-blader, with the blades rigidly attached to the steel hub, and that gimbal mounting is employed. The blade thrust bearings are unloaded in flight by hydraulic pressure

EXERCISE "DAWN"

Bomber, Coastal and Fighter Commands in Action

IT was a friendly war which raged up and down the North Sea just prior to Whitsun, when "Exercise Dawn" brought into competition—and very close co-operation—the Senior and Junior Services. While Service chiefs were careful at the outset to point out that these were not manœuvres but training exercises, once things got moving, a healthy and cheerful spirit of rivalry developed between sea and air, typified by the incident which marked the close of "Red Fleet's" participation. Two battleships, an aircraft carrier, a cruiser and their attendant escorts had been harried up the length of the North Sea for two days by fighter-bombers, torpedo-bombers and heavy bombers.

Ploughing through choppy seas in bright sunlight 60 miles east of the Shetlands, they had their last air attack. Lincolns and Lancasters of Bomber Command swept over at 15,000ft in their bombing run, with Sea Furies buzzing round them like wasps. Then from Admiral Russell's flagship *Superb* flashed a signal, "Come down and let us see you." Bombing leader snapped up the challenge, and down went the seventeen Lincolns to 3,000ft over the great "battlewaggons" in a final "beat up." As the bombers turned away on their course for Peterhead and their East Anglian bases, the Admiral flashed "Thanks"—as polite a conclusion to an air raid as we remember!

The same spirit of friendly rivalry and co-operation prevailed even more markedly at the nerve centre of the Exercise—Area Combined Headquarters at Pitreavie Castle, Dunfermline. There, beneath 80 feet of concrete, in the air-conditioned Operations Room, where so much of the work of our Fleet and Coastal Command was planned and ordered in wartime, air marshals and admirals rubbed shoulders, captains and wing commanders compared notes and signals and watched the moves they had initiated working themselves out as symbols on the great painted wall chart.

As Capt. J. Boutwood, R.N., chief of staff to the Flag Officer, Scotland, so fairly commented in his final summing up: "I cannot over-emphasize the value of the combination factor in this exercise. Its chief value has been the experience that we—R.A.F. and Navy—have gained of working together. Neither Air Force nor Navy can, in the foreseeable future, ever hope even to exist, let alone achieve success, without complete co-operation; and the more we are together, the better we shall be. In this exercise, it has perhaps appeared that a preponderance of the air has been pitted against a surface fleet, but in no sense has that been pure competition. . ." he added.

And at the preliminary briefing aboard the aircraft carrier *Theseus* at Rosyth before the exercise started, Air Vice-Marshal E. J. Kingston-McCloughry, C.B.E., D.S.O., D.F.C., A.O.C. of No. 18 Group, turned to his joint controller, Admiral Sir Frederick Dalrymple-Hamilton, K.C.B., and smilingly commented: "I can't tell you how glad I am that I shall have an admiral alongside me ashore. So often in the old days we had to deal with an admiral swanning about in the fog at sea!" Fortunately, no one had to any "swanning" about in the fog. A cold front went through the sea area just before operations began, leaving patches of thick cloud over the North Sea for a while; but these broke up just in time, and thereafter the weather conditions could hardly have been better.

Vice-Admiral Sir Rhoderick McGrigor, C.-in-C. Home Fleet, boards his Expediter at Lee-on-Solent prior to leaving for Exercise Dawn.

"Exercise Dawn" was primarily planned by the Admiralty to justify the statement of the Minister that a balanced and powerful Home Fleet could put to sea at short notice. "Red Fleet" was, perhaps, more of a task force than a Fleet; but a strong one, with the battleships *Anson* and *Howe*, the fleet carrier *Implacable*, the cruiser *Superb* and 15 escort vessels. Embarked in *Implacable* was the 17th Carrier Air Group, consisting of the 13 Sea Furies of 807 Squadron, the 12 Firefly IVs of 810 Squadron, and six Barracuda anti-submarine aircraft of 815 Squadron. The Group has been working up at Eglinton; and this was the first time that either Sea Furies or Firefly IVs had operated as a squadron from a carrier. The air defence of the fleet was supplemented by the 12 Sea Hornets of 801 Squadron operating from R.N.A.S. Arbroath.

Opposed to the Red forces—assumed to be an enemy fleet attempting to break out through the North Sea to harry Atlantic shipping—was Blue Force, a "mixed bag" of R.A.F. Fighter, Bomber and Coastal Command aircraft and others from Naval Aviation, controlled from Area Combined Headquarters at Pitreavie. Fighter Command was represented by 12 Hornets of 65 Squadron, which moved up from Linton-on-Ouse to Acklington for the exercise. Unfortunately, they were available for only the first day of the exercise; and the long-range bomber attack on the second day had to be mounted with only a "theoretical" fighter escort. Coastal Command's contribution was ten G.R. Lancasters from 120 Squadron (Leuchars); 203 and 210 Squadrons (St. Eval), all operating from Leuchars for the exercise; and five Sunderland flying boats from 230 and 201 Squadrons, which flew up from Calshot to Alness, in the Far North.

Bomber Command

Bomber Command contributed 19 Lincolns and seven Lancasters. From 1 Group there were operating from Binbrook three Lincolns of 101 Squadron, three of 617 Squadron, and one each from 9 and 12 Squadrons; and from Hemswell there were two Lincolns from 100 Squadron and one each of 83 and 97 Squadrons. From 3 Group there were operating from Wyton three Lincolns of 15 Squadron, two of 138 Squadron and one each from 44 and 90 Squadrons; while the Lancasters which formed the "window"-dropping decoy force operating from Stradishall were drawn three from 207 Squadron, two from 35 Squadron and one each from 115 and 149 Squadrons. Naval Aviation contributed to Blue Force 11 Firebrands of 813 Squadron and three Mosquitoes of 772 Squadron, all operating from R.N.A.S. Arbroath, and the 14th Carrier Air Group, which operated from R.N.A.S. Donibristle after moving up from Ford. This consisted of 13 Seafire 47s and 12 Firefly IVs, the naval strike wing being commanded by Lt. Cdr. J. Sleigh.

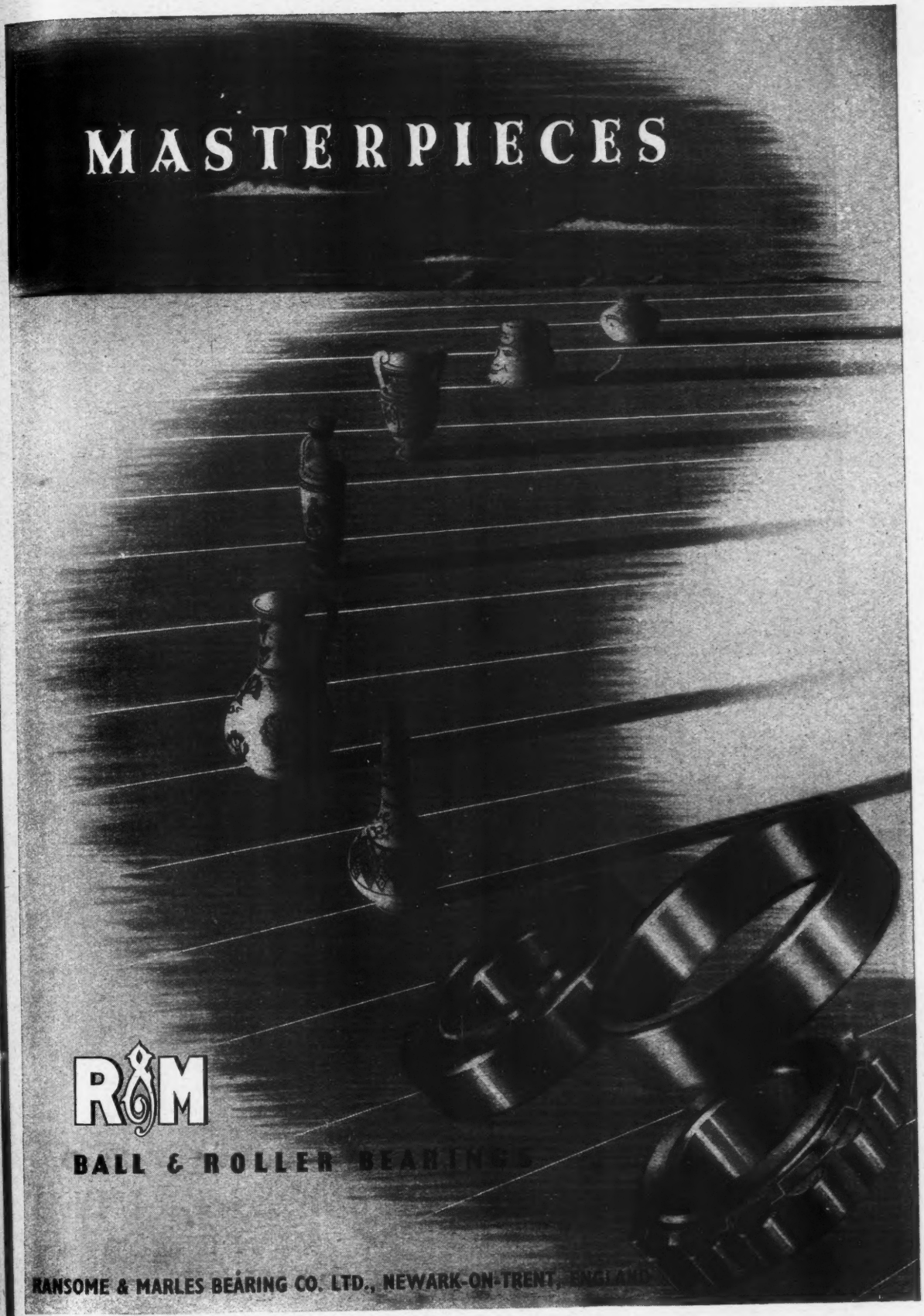
There were thus 136 aircraft taking part, 83 of them Naval. Shore-based aircraft were almost exactly equally divided, an indication of the growing strength of this side of Naval Aviation. Also in Blue Force were ten submarines of the 3rd and 5th Submarine flotillas, seven of them of the post-war A class-fitted with "Snort," our version of the U-boat Schnorkel apparatus.

The exercise began at 6 a.m. on Thursday, May 13, when the Red Fleet was steaming north off the Fife coast, about 100 miles out. Lancaster F-Freddy of 120 Squadron, airborne at 0529 and on patrol half an hour later, first picked up the fleet on radar at 0645 and reported back to H.Q. "Freddy's" job was to shadow unobtrusively, operating below the enemy radar horizon (except for the brief periods when it became necessary to close the distance to replot the target position), shadowing at maximum range and from a variety of bearings to avoid fighter interception. Airborne at 0600 was Lancaster G-George, whose job it was to lay the "Gate" for the bomber force, and half an hour later, Lancaster V-Victor, to home the decoy force of Lancasters from Stradishall.

At 0640, the Bomber force took off from East Anglia, where early morning fog made things difficult. At Stradishall, gooseneck flares were used, in visibility down to 100 yards, to get the Lancasters away to time—a very creditable performance. At 0738, the bombers—18 Lincolns led by three from Binbrook, flying in loose vic formation—made rendezvous with the escort of ten Hornets over Acklington and carried on North, homed by G-George.

The homing was successfully made and the bombers given a vector to the target; but the whole area was covered with thick cloud down to 3,000 feet, and, though the bombers flew over the fleet at 0820 at 17,000 feet, the attack was officially deemed abortive, as a visual attack could not be made. The bombers turned south to return to base. This was a disappointing start, but the Lincolns made a fine "come-back." Combined Headquarters, advised by their "met men" that the cloud was breaking up, signalled them to reassemble and renew their attack, visually, if possible, but by blind bombing on radar fixes if necessary. This signal experienced some delay and was too late to stop the Wyton Lincolns landing; but the Binbrook and Hemswell bombers returned to the attack. In the meantime, however, first blood had already been drawn. The "window"-dropping Lancasters had done their job of drawing off the Fleet's fighters, and V-Victor, which homed them, was "shot down" by Sea Furies.

(To be continued.)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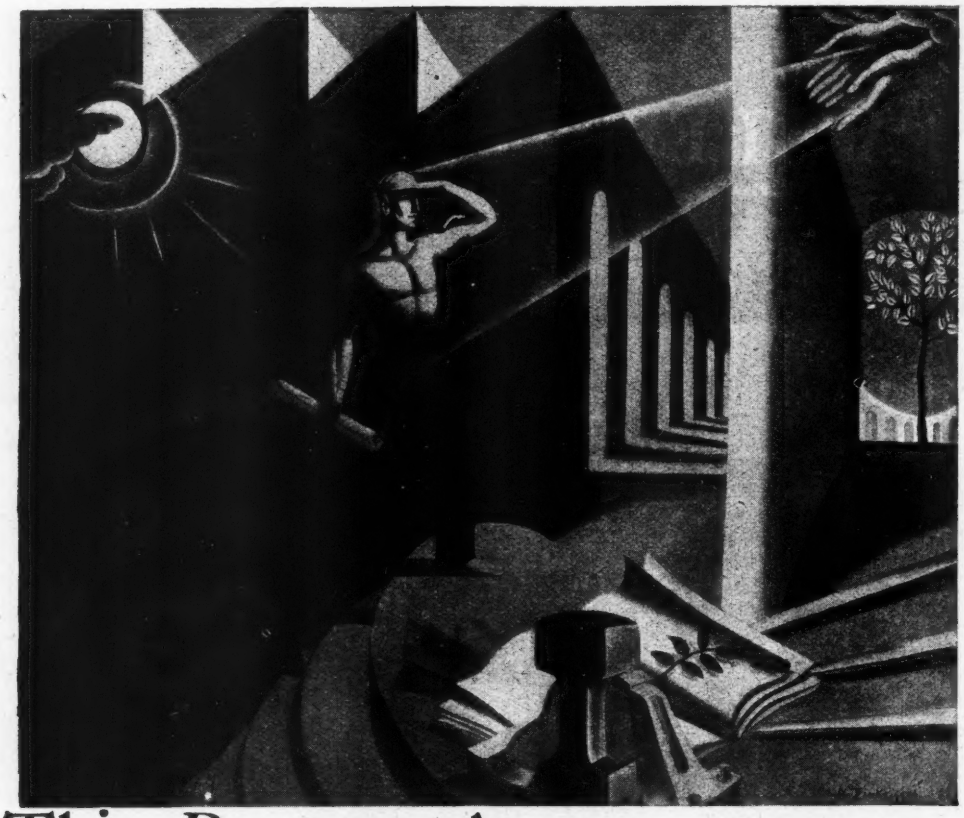

This Present Age . . 5

In the forefront of our plans for the future we place the training and education of every youth who enters our organisation. Schemes are in operation and there is already an equal opportunity for all who desire to avail themselves of the facilities provided. Science, technology and commercial knowledge are the three great requirements of industry. It will be our privilege to ensure that these aims are rightly and efficiently fostered within the framework of the national educational policy. By the pooling of knowledge for the common good, industry is fulfilling one aspect of its rightful service to the nation. For a boy of intelligence and imagination, apprenticeship to the iron and steel industries provides training for a life's work requiring initiative, technical knowledge of a high order and the ability to understand one's fellow men. The successful organisation of many thousands of workers presents problems of understanding in human affairs equal to the technical problems of economic production. Industry is a major part of our social life as well as the means of national wealth, therefore the discipline of education provides the means for developing those talents with which each one is endowed, and ultimately enriching the inheritance of the country whose citizens we are.

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CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

LIGHT AIRCRAFT ENGINES

The Two-stroke is Worthy of Consideration

REFERRING to Mr. A. G. J. Brown's plea in *Flight* of May 6th for the development of a 40-50 h.p. light aircraft engine, I would like to suggest once more that there is still a lot to be said for the simple three-port air-cooled two-stroke type of, say, the four-cylinder variety, with a cubic capacity of about 2 litres.

Is it too late to suggest that an up-to-date design of this type be developed and thoroughly flight-tested to find out what it really will do? To my mind, it still seems well worth while, particularly from the viewpoint of economy in manufacture which the type offers.

Even if it is desired to add a small amount of complication in the interests of higher output, some very interesting possibilities arise with the application of the Kadenacy system of ballistic charging.

The simple two-stroke can play the same part in light aviation as it has done for the past thirty-five years in light road and water transport. Will it be given the opportunity?

Farnborough, Hants. C. F. CAUNTER.

MULTI-WHEEL UNDERCARRIAGES

"Comparator" is Challenged to a Friendly Wager

"COMPARATOR" may come out from behind his flimsy disguise of a new *nom de plume*. Who, as he himself might ask, does he think he is fooling with his stratagem? Could anyone believe that this literary shadow-boxer, who employs with such facility the techniques of a London University student, an English aeronautical engineer, a Hollywood publicity man and a 42nd Street columnist, could be any other than . . . ? But we shall desist in deference to an apparent editorial wish.

What I really wanted from "Comparator" was an explanation of why he selects for criticism the single-wheel undercarriage system of the Convair XC-99. Is he not aware that this is a temporary arrangement, that production versions of the B-36 (the bomber twin of the XC-99) already have quadruple main-wheel assemblies, and that similar gear is proposed for any future "99s" civil variants?

As for British landing gears being "a jump ahead of the Americans" I am prepared to gamble a silver dollar—or, should "Comparator" prefer them, two cupro-nickel half-crowns—that, following the experience of Consolidated-Vultee, the Brabazon will eventually appear with several more wheels or with a redesigned main undercarriage.

Kingston, Surrey. "IMPERATOR."

DIESEL ENGINES FOR AIRCRAFT

Questions of Combustion and Compression

REFERRING to the letter from Air Commodore Banks in your Correspondence column of May 6th, I feel I must correct the mistaken impression which that letter gives about the diesel aircraft engine's efficiency.

It is absurd to say that a diesel engine only burns 80 per cent of the air whereas the petrol engine burns 100 per cent. As a matter of fact, it is only the oxygen in the air which is used, and as there is only about 25 per cent of that combustible in the air, it is difficult to see how the petrol burns 100 per cent of the air as the 75 per cent of nitrogen does not burn. Even the diesel engine will not burn 80 per cent of the air, in spite of its very high supercharging and compression which is very much more likely to burn up all the air than is the petrol engine, with its comparatively low compression pressure, viz., 300 lb/sq in against the diesel's 650 lb/sq in. Total diesel combustion pressure 1,450 lb, petrol total 800 lb.

What might be meant is that the two-stroke diesel gives 80 per cent full power against the four-stroke petrol engine which, as it only gives a power stroke every other revolution, gives 50 per cent full power. This means that the petrol engine gives in each stroke 100 per cent power, whereas the diesel engine two-stroke gives in each stroke 90 per cent power. But as the diesel gives double the number of power strokes, it should also be 30 per cent lighter than the petrol engine, which I think it most probably will be very soon.

Again, as the diesel engine does not use a fuel which overheats the engine, as high-octane petrol does, it can operate at 80 per cent full throttle, whereas the petrol engine can only operate at 60 per cent when cruising, otherwise it overheats. The diesel aircraft engine will give a higher cruising speed.

The petrol engine is very wasteful in all directions. Its exhaust gas temperature is actually 1,650 deg Fahr., whereas the exhaust gas temperature of the diesel engine is 950 deg Fahr. only, which is hardly red-hot iron heat. Heat, it must be remembered, is power.

The flash point of petrol is 30 deg Fahr. below freezing point, which means that it is constantly giving off vapour, especially in hot climates, and as this vapour is explosive it is, of course, sheer madness using such a fuel on air liners. A railway company will not allow even a sealed tin of creosote to be carried in the guard's van or any part of the train. This is the law of the country and was instituted by past experience. It is very noticeable that trains never catch fire in a crash

It is also noticeable that when an aircraft does not happen to catch fire in a crash, very few people are killed. Hardly anybody, in fact, as everything one bumps against is of a light nature and gives considerably. I have had it.

Again, the exhaust gas of petrol is very poisonous as it contains 5 per cent carbon monoxide, whereas diesel exhaust only contains 1 per cent so that it is practically non-poisonous. A leak into the cockpit of a single-engined petrol aircraft will cause the pilot to pass out in 15 minutes. Many accidents have been caused by this.

It is obvious by these few remarks and figures that the diesel engine is infinitely superior to the petrol engine for civil aviation. Especially considering that the fuel consumption is 20 per cent less and is a third of the price. Engineers of long standing in engine-building firms agree on this.

To say that it will take ten years to develop a diesel aircraft engine, when it is already developed for aircraft use and weighs only 1 lb per h.p. against the petrol engine (which weighs 1.3 for the Rolls-Royce Griffon or the Bristol Hercules) shows a lack of knowledge of engineering production.

Westcliff-on-Sea, Essex. J. R. GOULD.

[*Evidently the writer of this letter is not aware of the work of Air Commodore Banks, or he would not accuse him of a lack of knowledge of engineering production.*—ED.]

FORTHCOMING EVENTS

May 21st.—Institute of Navigation: "Meteorology in Aviation: Is it Obsolete?" Francis Chichester.
May 22nd and 23rd.—Shannon Aero Club Rally.
May 24th to 29th.—Aircraft Exhibition Cardiff.
May 27th.—Royal Aeronautical Society: Wilbur Wright Memorial Lecture. A. Gouge, B.Sc., F.R.Ae.S.
May 29th and 30th.—Netherlands Aero Club Invitation Rally, Ypenburg, Holland.
May 29th and 30th.—Butlin's Week-end Air Rally. Speeton, Filey, Yorks.
June 5th.—Cardiff Air Display.
June 5th.—Derby Aero Club: Flying display at Burnaston airport.
June 12th.—Wolverhampton Aero Club "At Home."
June 12th and 13th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.
June 13th.—Henri Bardel Cup for model aircraft with mechanical motors.
June 19th to 21st.—Royal Aero Club Week-end for Foreign Guests, London.
June 26th and 27th.—Butlin's Week-end Air Rally. Broom Hall, Pwllheli N. Wales.
July 3rd to 5th.—Private Air Rally for members and associate members of the Royal Aero Club at Deauville, France. (Guests of M. F André.)
July 3rd.—R.Ae.S. (Glasgow): Visit to Blackburn Aircraft Ltd., Dumbarton.
July 17th.—Southend-on-Sea Air Rally.
July 19th to 31st.—Swiss International Gliding Competitions, Samaden.
July 24th to 26th.—Private Air Rally for members and associate members of the Royal Aero Club at La Baule-Escoublac, St. Nazaire. (Guests of M. F. André.)
July 31st.—Aero Club of Orange Air Rally.
July 31st to Aug. 8th.—International Model Aircraft Meeting, Eaton Bray, Beds.
Aug. 1st.—Boroden Cup for Model Aircraft with mechanical engines, London Region.
Aug. 7th.—Air Meeting and Competitions at Ypenburg, Holland.
Aug. 27th to Sept. 5th.—Aero Club de France. "Tour de France."
Aug. 28th and 29th.—Cinque Ports Flying Club. International Flying Meeting. Lympne, Kent.
Sept. 7th to 12th.—S.B.A.C. Exhibition and Display, Farnborough airfield, Hants.
Sept. 18th to Oct. 3rd.—Copenhagen Show, organized by the F.B.I.
Oct. 15th to 24th—Third International Aircraft Exhibition, Forum Exhibition Hall, Copenhagen.

AMPHIBIAN TANKER : Aircraft of the R.C.A.F.'s two photographic squadrons are preparing to leave for scattered points and, in many cases, will operate from isolated Northern bases. At one of these a Canso amphibian is seen unloading fuel drums which are floated ashore, pumped full of fuel from the Canso's tanks, and stored for the use of short-range single-engined Norsemen.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

Appointment

THE Air Ministry announces that His Majesty the King has approved the appointment of Air Vice-Marshal Philip Clermont Livingston, C.B., C.B.E., A.F.C., F.R.C.S., F.R.C.S.(E), L.R.C.P., D.P.H., D.O.M.S., as an Honorary Surgeon to His Majesty the King, with effect from May 7, 1948, in succession to Air Marshal Sir Andrew Grant, K.B.E., C.B., M.B., Ch.B., D.P.H., who has vacated the appointment on retirement from the R.A.F.

Air Vice-Marshal Livingston succeeded Air Marshal Sir Andrew Grant as Director-General of Medical Services, Royal Air Force, on March 1, 1948, after having been Deputy Director-General from September, 1947. Previously he served for over a year as Principal Medical Officer at headquarters of Air Command, South-East Asia, and he was formerly consultant in ophthalmology at the R.A.F. Central Medical Establishment. He rowed in the winning Cambridge crew in the 1914 Boat Race, and after serving with the R.N.V.R. in the 1914-18 war he was commissioned in the Medical Branch of the R.A.F. in 1919.

Mountaineering Vice-President

LORD MALCOLM DOUGLAS-HAMILTON, formerly a group captain in the Royal Air Force, has become a vice-president of the recently formed R.A.F. Mountaineering Association. He has done a good deal of mountaineering in Switzerland, Scotland, and the Isle of Skye, and is a member of the Alpine Club.

Australia—New Zealand in 4¾ hours

IN 4¾ hours, at an average speed of 282 m.p.h., the Handley Page Hastings (four Bristol Hercules), now touring Australasia, has flown the 1,340 miles from Sydney to Wellington. This compares with the 6½ hours which the average airliner takes for the ocean crossing. Major R. E. Nicoll, Handley Page sales manager, who is with the Hastings on its tour, reports that there is very real interest in this, the fastest and largest British military transport, as well as in its civil counterpart, the Hermes. From Government and aeronautical circles in the Dominions there is an attitude of helpfulness.

New Zealand has a town of Hastings and its mayor, a pilot, has flown with his officials in the Hastings, which circled above the namesake town. Over the centre, the mayor received from the Handley Page chief test pilot, S/L. H. G. Hazelden, a letter of cordial greetings and good wishes from the mayor of Hastings in Sussex. By coincidence, Major Nicoll's mother, many years ago, presented the first gift (a Union Jack) from the Sussex Hastings to its New Zealand namesake.

N.A.A.F.I. Supervisors

FOUR N.A.A.F.I. Assistant Command Supervisors (R.A.F.) have been appointed for liaison duties with R.A.F. home commands, groups and stations through the new R.A.F. Regional Institute Committees which have just been formed to ensure adequate and satisfactory N.A.A.F.I. facilities, and on which existing Station Institute Committees will be represented by elected members. The R.A.F. Regional Institute Committees have been formed on the basis of one committee for each geographical area administered by the six Group Headquarters of Reserve Command and by R.A.F.N.I., since these areas correspond with those of the N.A.A.F.I. Command Supervisors.

Liaison with the R.A.F. Regional Institute Committees in the Scottish and Northern areas will be undertaken from York; the Western and Welsh Group and R.A.F.N.I. area from Burton Wirral (Cheshire); the Southern Group area from Salisbury, and the Eastern and London Group areas from London, where the four N.A.A.F.I. Assistant Command Supervisors specifically responsible for R.A.F. affairs will be situated. As the geographical relationship of these areas corresponds with those of Reserve Command Groups, and R.A.F. Northern Ireland, the Air Officers Commanding concerned will be appointed as the Presidents of the R.A.F. Regional Institute Committees in these areas.

Washington Post

THE Air Ministry announces the appointment, to take effect this month, of Air Marshal Sir Charles B. H. Medhurst, K.C.B., O.B.E., M.C., as head of the Air Force Staff, British Joint Services Mission at Washington, in place of Air Chief Marshal Sir A. Guy R. Garrod, G.B.E., K.C.B., M.C., D.F.C., L.Ld., who has completed his tour of duty in this post

Air Marshal Sir Charles Medhurst was appointed A.O. C.-in-C., Middle East Command, in February, 1945, and Air C.-inC. R.A.F. Mediterranean Middle East Command in the following October. He was Commandant of the R.A.F. Staff College from August, 1943, to December, 1944. Sir Charles was appointed Assistant Chief of the Air Staff (Intelligence) in March, 1941, and was made an additional member of the Air Council in October, 1942, while acting as Vice-Chief of the Air Staff. He became Assistant Chief of the Air Staff (Policy) in March, 1943. Sir Charles was commissioned in the Royal Inniskilling Fusiliers in 1915 and was seconded to the Royal Flying Corps in the same year. He served with various squadrons in France and the Middle East and was awarded the M.C. in 1918. After the 1914-18 war he served on technical engineering and staff duties and in 1925 graduated at the R.A.F. Staff College. In the following year he served in Iraq on Air Staff duties, returning to England for a course at the

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anyone would think you're travelling by flying boat!"

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Service Aviation . . . . .

Imperial Defence College in 1929. From 1931 to 1934 he was an instructor at the R.A.F. Staff College. He was appointed Deputy Director of Intelligence at the Air Ministry in 1935 and Air Attaché at Rome in 1937.

Air Attaché, Moscow

AIR COMMODORE N. C. OGILVIE-FORBES, O.B.E., formerly Head of the R.A.F. Delegation in Belgium and British Air Attaché in Brussels, has taken up a fresh appointment as Air Attaché in Moscow in succession to Air Commodore C. B. Wincott, C.B.E.

Air Commodore Ogilvie-Forbes was born in London in December, 1900, and after being educated at the Oratory School, Edgbaston, and Trinity College, Cambridge, was commissioned in the General Duties Branch of the Royal Air Force in November, 1922. He was in Canada from 1929 to 1933 on an exchange of duty with an officer of the R.C.A.F., and in January, 1939, he was seconded to the Royal Iraqi Air Force for two years. During the greater part of the war he commanded various Royal Air Force stations in the United Kingdom, and for some months in 1942 he was at the Air Ministry as Deputy Director of Operations (Naval Co-operation). He went to Belgium as Air Attaché in September, 1945, and became head of the R.A.F. Delegation there in the following January.

Auxiliary Inspection

LONDON units of the non-regular Air Forces were inspected by Air Marshal Sir Alan Lees, Air Officer Commanding-in-Chief, Reserve Command, R.A.F., on Sunday, May 9th. In the morning Sir Alan inspected Nos. 601 (County of London) and 604 (County of Middlesex) Squadrons of the R.Aux.A.F. at their base at Hendon, and in the afternoon he went to No. 1 Reserve Flying School, Panshanger, Herts, where there was a fly-past by Nos. 600 (City of London), 601 and 604 Squadrons. (All three units are equipped with Spitfires and No. 600 is based at Biggin Hill.) This was followed by formation flying by 15 Tiger Moth trainers of the school. Later in the afternoon Sir Alan visited No. 83 R.A.F. Reserve Centre, No. 2604 (Light Anti-Aircraft) Squadron of the R.Aux. A.F. Regiment and No. 3604 Air Defence Unit at Stanmore Park.

NO RESERVE : Air Marshal Sir Alan Lees, A.O.C.-in-C. Reserve Command, chats with a Regular—W/O. E. Langford—during his recent visit to R. Aux. A. F. Squadrons at Hendon, reported on this page.

"FOREWARNED IS FOREARMED" : Air Marshal Sir William Elliot, A.O.C.-in-C., Fighter Command, and A. Cdre. the Earl of Bandon, Commandant of the Royal Observer Corps, watch the activity on the main plotting table at Bedford during the big R.O.C. exercise held on May 8th. Details appeared in "Flight" of May 6th.

Aircrew Long Service

AIRCREW pilots and navigators on five-year engagements are being urged to volunteer for long-service engagements with a view to pension after 22 years' regular service. Those who are not eligible or do not wish to sign on for so long may extend their aircrew service by one, two, three or four years at their choice, with a further gratuity of £40 for each extra year.

R.A.F.V.R. Club at Cambridge

THE V.R. Social Club organized by No. 22 Reserve Flying School, Cambridge, believed to be the first of its kind in the R.A.F.V.R., has now been in existence six months. Various social events and flying "at homes" have been planned, and members may use a billiards table and tennis courts at the aerodrome. Among the events planned for the future is a sports day.

Since social facilities have been provided, V.R. membership at Cambridge has risen sharply and now stands at a total of 66 pilots, with another 18 applications recommended for acceptance. This response is also partly due to a publicity drive in the area last January with a combined Volunteer Reserve and Air Training Corps window display.

Ground training for R.A.F.V.R. pilots at Cambridge Reserve Flying School began recently, and to stimulate interest in the course, al lectures are being supplemented as far as possible by films, demonstrations with models and practical work. Novelty in ground training services is being introduced by various Reserve Flying Schools in several different ways. One or two are covering most of the syllabus by correspondence.

Cadet Proficiency

RESULTS of the February A.T.C. Proficiency Certificate examinations just published show that 1,000 cadets have passed. This brings the total of A.T.C. Proficiency Cadets to 3,600. In addition, 100 cadets were set a total of 296 advanced examination papers, out of which only 50 papers were failed. The subjects on which these papers were set included navigation, airmanship, law and administration, meteorology and aircraft recognition.

Seaweed Survey

LANCASTERS of No. 120 (G.R.) Squadron of Coastal Command, based at R.A.F. Leuchars, are engaged on their first large-scale photographic survey task since the war ended. To provide data for the Scottish Seaweed Research Association, they are taking air photographs of the coast line of the Orkneys, Shetlands, Islay and Jura groups of islands, which are expected to show exactly where the seaweed beds lie, their extent, and where the greatest "harvest" can be gathered. The technique developed in submarine hunting and reconnaissance over the sea by Coastal Command during the war years has been successfuly adapted, and the K-17 cameras which picked up the U-boat at periscope depth are now peering through fathoms of water to seek out the "tangle of the isles."

To obtain "verticals" on a scale 1/10,000 as required, the Lancasters fly at 5,000ft, using cameras fitted with 6-inch lenses. Each negative covers an area of 2,500 yards square, but there is an "overlap" of about 65 per cent on

Service Aviation . . . . .

each print. This is necessary, since only a directly vertical shot gives the undersea information sought; the edge of each print shows only the dazzle of sunshine on water. A green filter is used, and the resultant prints are remarkably clear.

The squadron began this operation on April 9th. To date, there have been eight sorties, each producing about 400 exposures, and about two-thirds of the area has now been covered.

Meeting the "Queens"

SUNDERLANDS and Lancasters of No. 19 Group, Coastal Command, R.A.F., are meeting the *Queen Elizabeth* and *Queen Mary* between 200 and 500 miles out from Land's End. The flights form part of the squadron's navigation exercises, using fast merchant shipping (the "Queens" cruise at 28 knots) and naval surface craft.

Times of departure from New York or Cherbourg are known at Group Headquarters in Plymouth, and the ships' positions are estimated at a given time for interception. Essential information is passed to the Squadron Commander, and the task is to locate, identify and shadow the liners at extreme radar range, which might be up to between 50 and 60 miles. Interceptions are made at all hours, day or night, and in almost all weathers. After shadowing for an hour, the aircraft fly in and show themselves, coming down to about 700 feet.

In addition to the Cunard Line, ships belonging to the Elder Dempster Line (west coast of Africa), the Pacific Steam Navigation Co. (South America) and the Union Castle Line (South Africa) co-operate in these exercises, thus providing a variety of interception positions. They include cargo, passenger-cargo, medium-speed passenger and the fast liners, and range from 15,000 tons to 83,000 tons.

R.A.F. Police Auxiliaries Badge

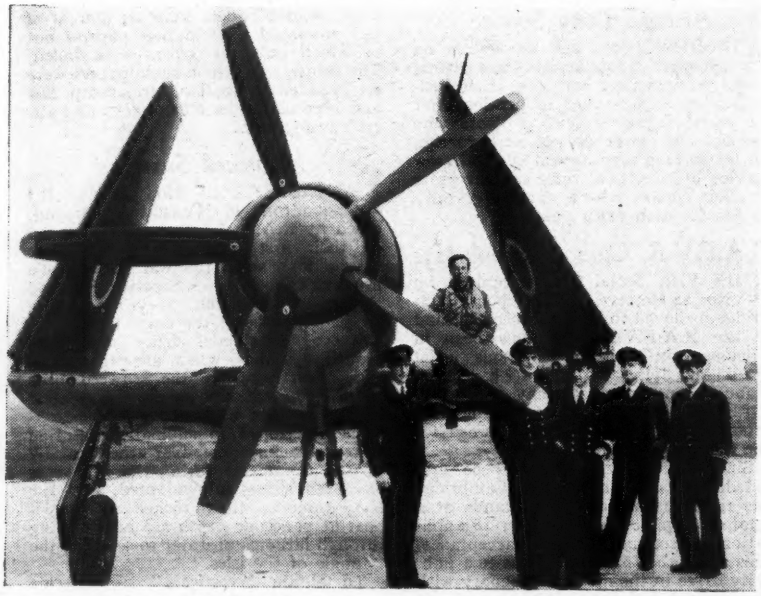
A CAP badge and shoulder flash for the locally recruited R.A.F. Police Auxiliaries overseas has been approved by the Air Ministry. The badge, which is chromium plated, is similar to the normal R.A.F. badge and bears the words "Police Auxiliaries." The shoulder flash is an oval with the words "R.A.F. Police Auxiliaries" in light blue lettering.

The Auxiliaries were formed just over a year ago for policing R.A.F. stations and property overseas. These duties were formerly performed by miscellaneous forces whose members had a variety of titles—wardens, warders, ghaffirs, chowkidars, watchmen and guards. Generally they lacked supervision and training, were uneconomically distributed and in some cases markedly inefficient.

Youngest Unit

NOS. 91 and 92 Squadrons of the R.A.F. Regiment (Malaya), formed last autumn from local recruits, recently held their passing-out parade at Kuala Lumpur. The squadrons, now fully trained, will be based at R.A.F. Stations Changi and Seletar respectively, both near Singapore. The squadrons were addressed by Air Vice-Marshal J. Whitworth Jones, Air Officer Commanding R.A.F. Malaya, who said: "The Royal Air Force Regiment (Malaya) is the youngest unit in the Royal Air Force, but you have a proud charge. I am sure that in the performance of it you will be worthy of the great service to which you belong and of the country which bred you."

After formal marching and rifle drill the Malayan airmen gave a physical training display and staged a short tactical exercise showing the operational role of the Regiment in the defence of airfields.



WORKING UP AT LEE-ON-SOLENT: A carrier air group, composed of squadrons flying Hawker Sea Furies and Fairey Fireflies, is working up at H.M.S. Daedalus (R.N.A.S., Lee-on-Solent) prior to joining H.M.S. Vengeance for the autumn cruise. Officers are seen with one of their new Sea Furies.

W.A.A.F. Non-Regulars

OFFICERS and Airwomen of the W.A.A.F. Reserve and the W.A.A.F. Volunteer reserve list (flying) are now to have the silver badge which, as recently announced, is now given to the R.A.F.V.R. and Royal Auxiliary Air Force. It is to be worn only with civilian dress, and may be retained by those who satisfactorily complete five years' service.

"P.T." Demonstrations

A TEAM of 36 instructors trained by the R.A.F. School of Physical Training, Cosford, Wolverhampton, has been formed to give public demonstrations in different parts of the country during the summer. First it is to be seen at Blackpool, where it will remain for a fortnight from May 16th. Two displays will be given daily on the forefront. On June 11th and 12th it will take part in a Tattoo in the grounds of Warwick Castle under the auspices of the Warwickshire County Committee of the British Legion. On July 7th the team travels to Ipswich for the annual British Legion Fête. On August 5th it will give a display at the Bakewell agricultural show. The team will be available to attend other functions and it is likely to have a full programme.

Officer Cadetships for the A.T.C.

THE most important recognition to date of A.T.C. service has just been announced. It is the waiving of the Civil Service Commissioners' written examination for certain A.T.C. cadets who compete for cadetships leading to permanent commissions in the General Duties, Equipment and Secretarial branches of the R.A.F. and in the R.A.F. Regiment. This concession only applies to A.T.C. cadets who hold the proficiency certificate and fulfil normal conditions of entry for candidates direct from civil life. That is, they must be between 17½ and 19, up to school certificate standard in education and unmarried British subjects. The concession does not apply to those who wish to be considered for cadetships in other Services, neither does it debar candidates from sitting the written examination if they wish.

Cadets may apply for any or all of the four branches, the application being made through their commanding officer. They will have to undergo a medical examination, a preliminary interview (if numbers make this necessary), and a full-scale R.A.F. Selection Board. Those applying for General Duties branch cadetships will also have to pass flying aptitude tests. The first selections under this new scheme will be made later this year and those chosen will begin their training next January. Cadets for the General Duties branch are trained at the R.A.F. College, Cranwell, Lincs, and for the Equipment and Secretarial branches at a special Wing of the College located nearby at Digby. Cadets for the R.A.F. Regiment are trained at the Royal Military Academy, Sandhurst. Cadets do not pay fees but are enlisted and paid as airmen, and commissioned on successfully completing the course. Applications should be submitted as soon as possible and must reach the Air Ministry not later than September 30th.

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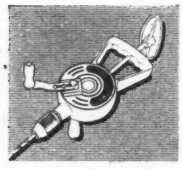

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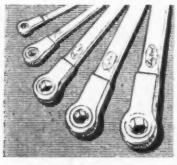

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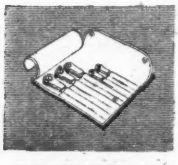

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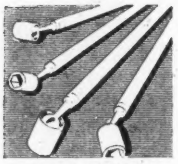

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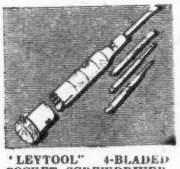

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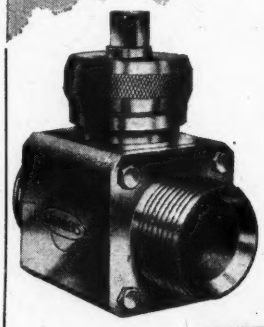

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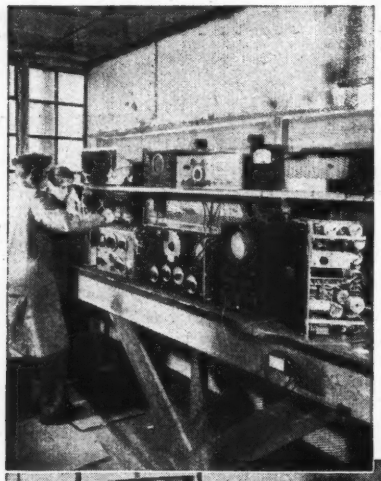

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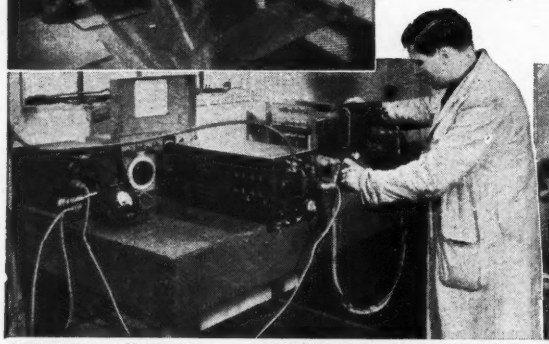

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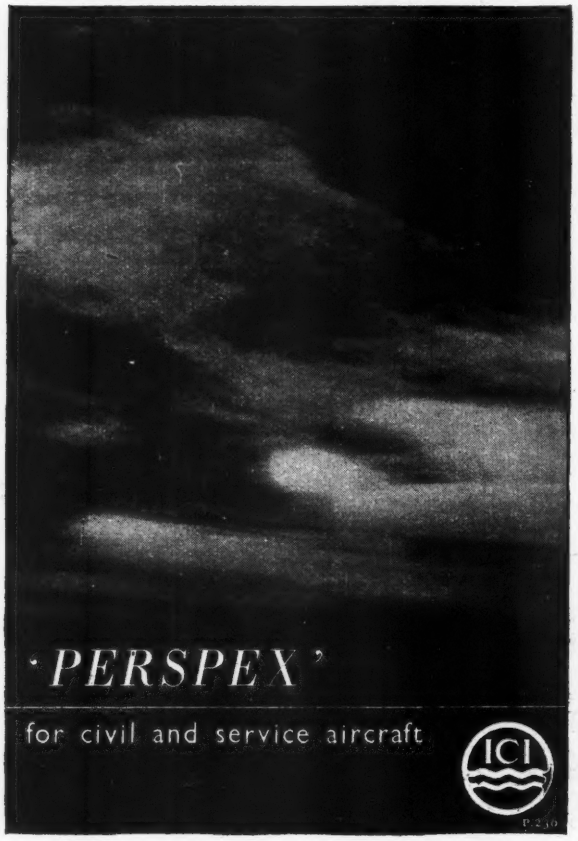

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Full details of the scheme including medical standards required are given in Air Ministry Pamphlet No. 96, obtainable from any R.A.F. Recruiting Centre or from the Air Ministry, Dept. FLC5, Victory House, Kingsway, London, W.C.2. Apply without delay.

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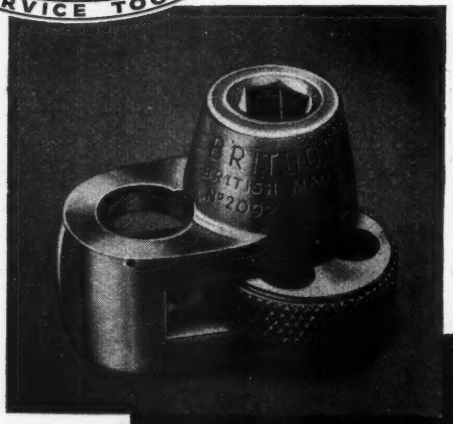

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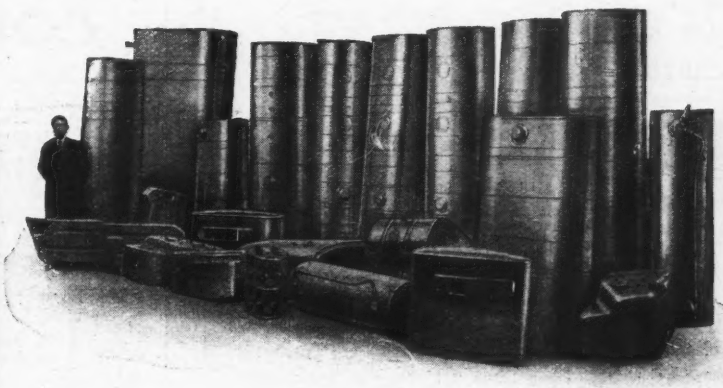

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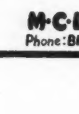

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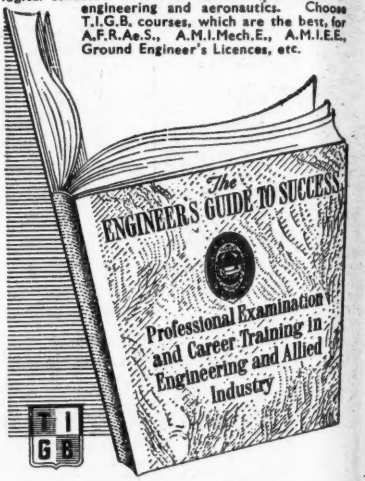
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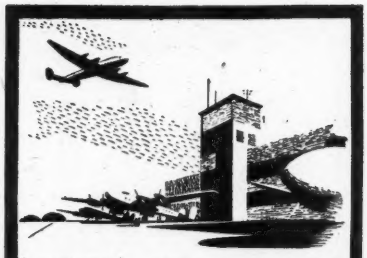

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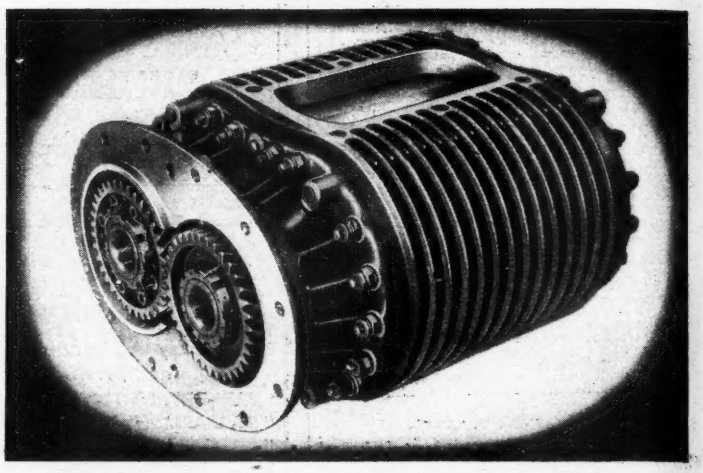

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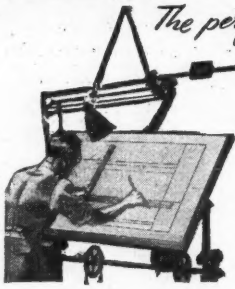

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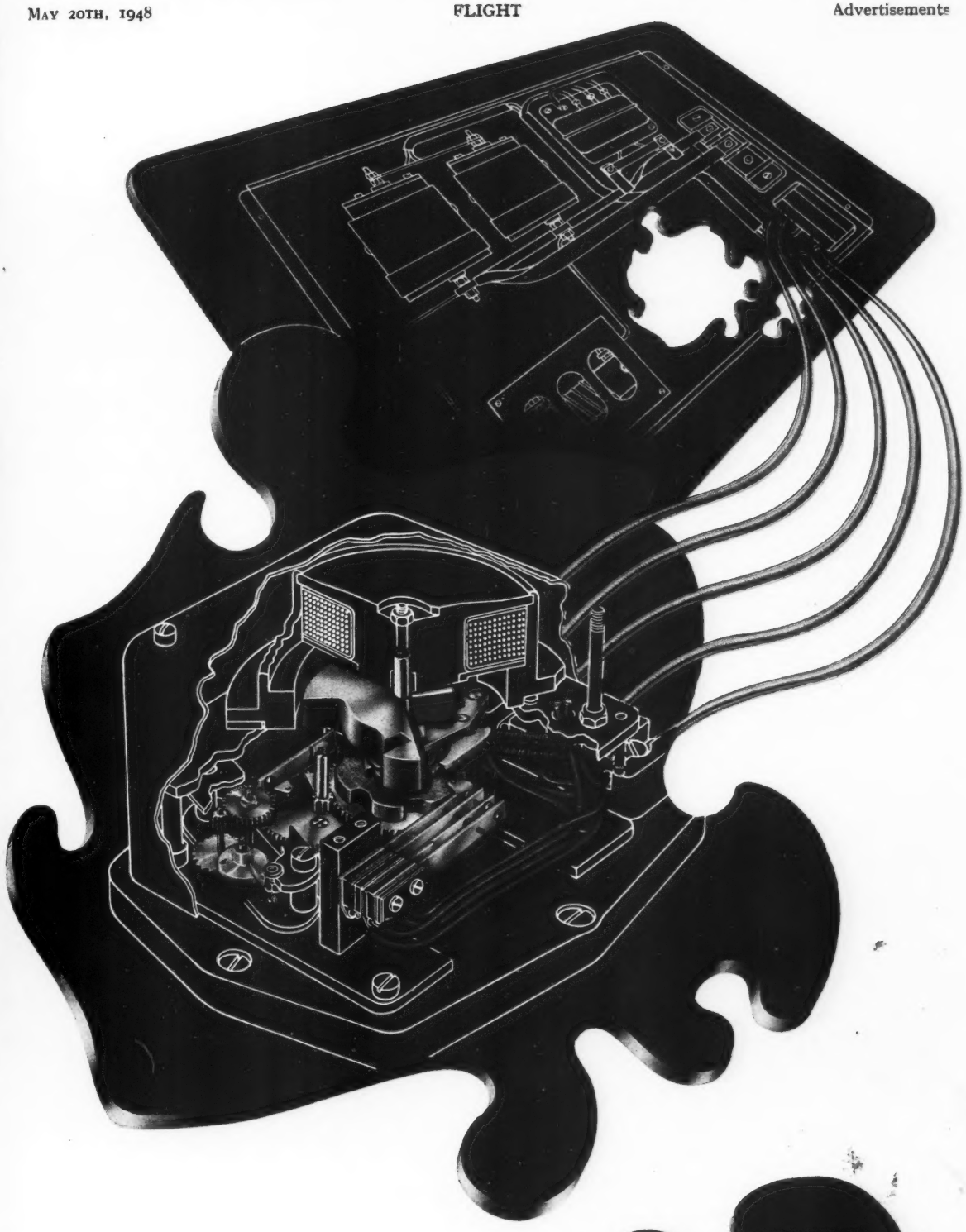

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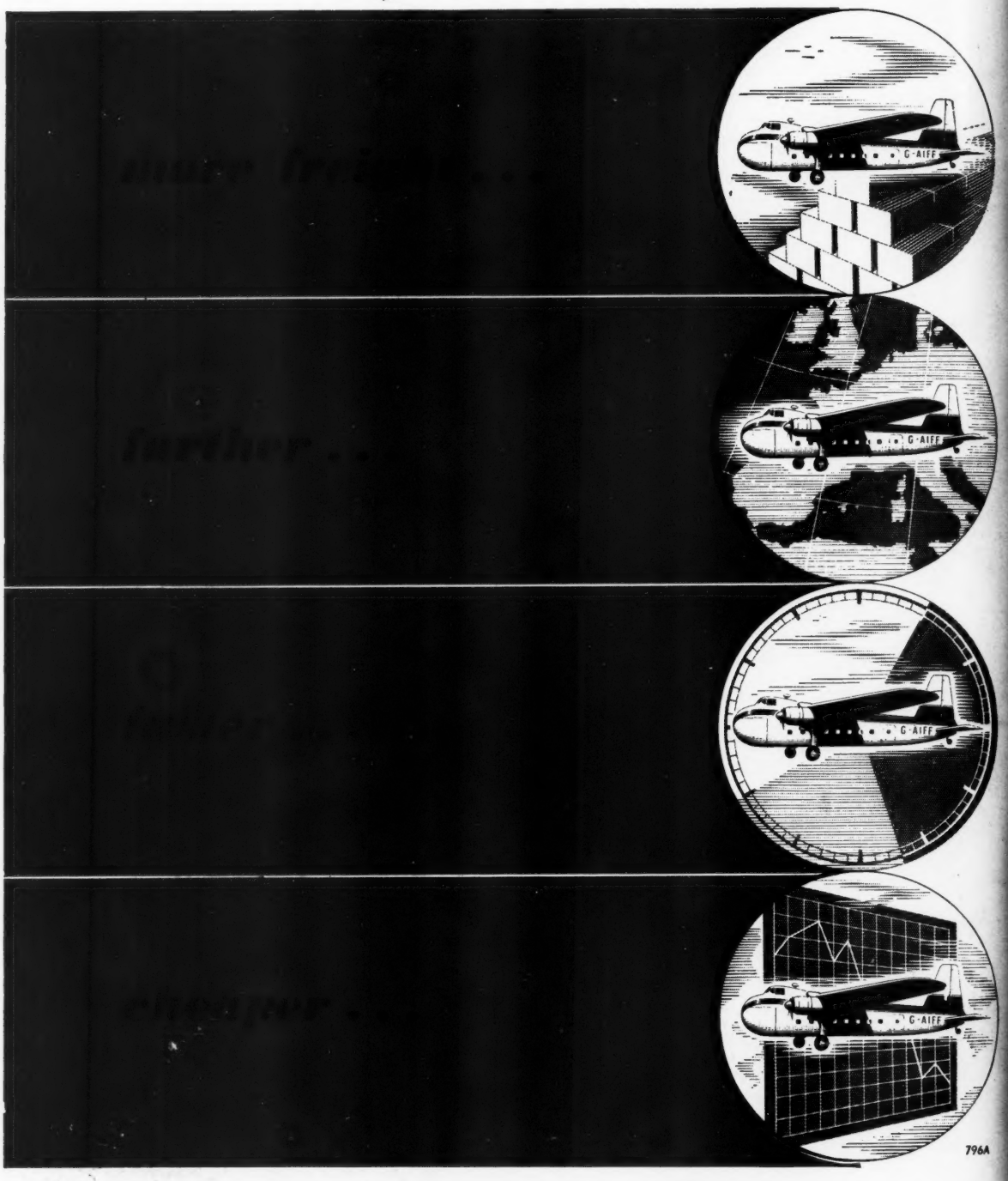

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